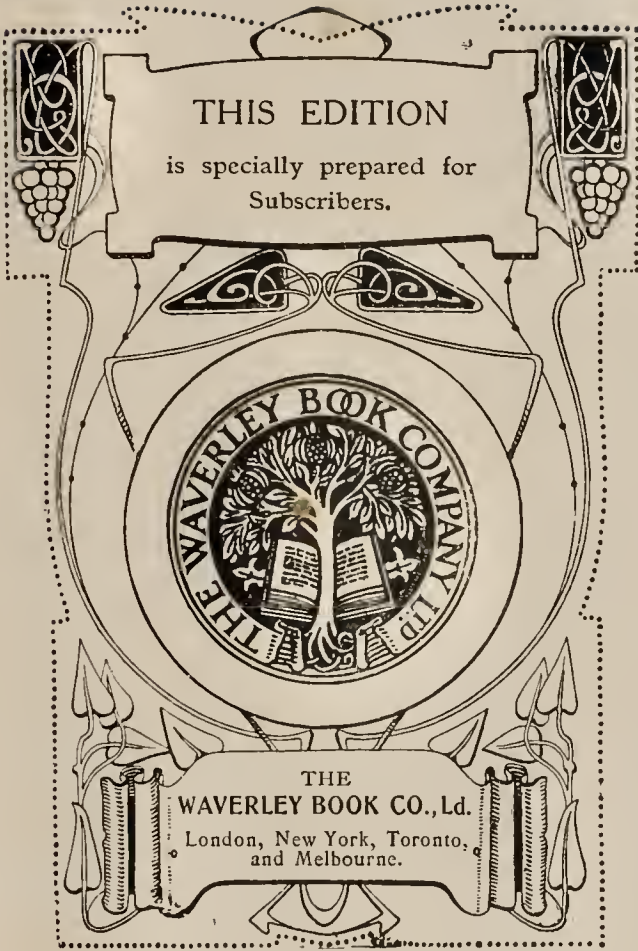




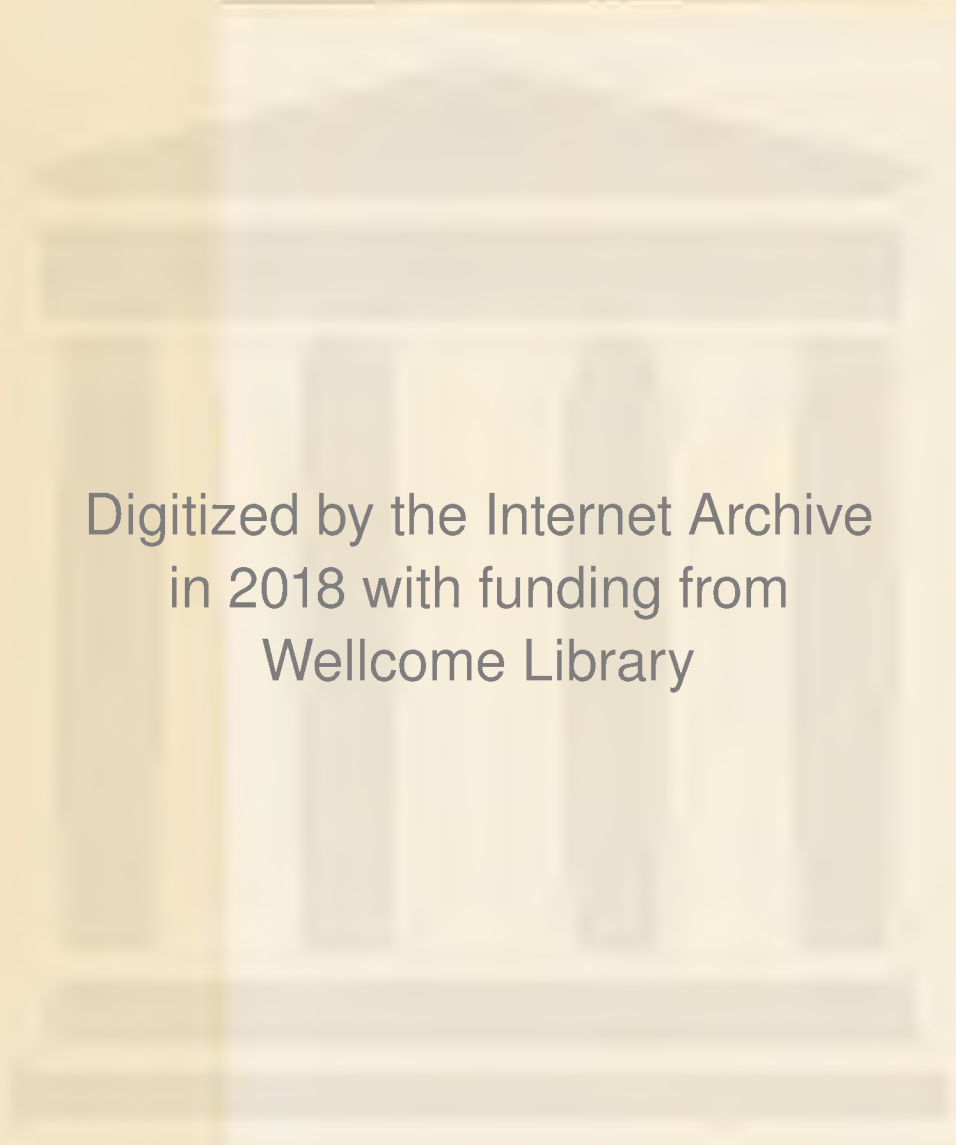
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THE PEOPLE'S PHYSICIAN



THE WHITE BLOOD-CELLS (PHAGOCYTES) DEVOURING MICROBES (p. 6).

IN THE FIRST CIRCLE NORMAL BLOOD-CELLS, RED AND WHITE, ARE SHOWN. IN THE OTHERS THE WHITE CELLS ARE SEEN ABSORBING (2) THE MALARIA PARASITE, (3) THE BACILLUS OF CONSUMPTION, (4) THE SPIROCHÆTE OF RELAPSING FEVER, (5) THE TRYPANOSOME OF SLEEPING SICKNESS.

Cassell's People's Physician

A Book of Medicine and of Health
for Everybody

Illustrated with Coloured and Black-and-White Plates
and with Figures in the Text

IN FIVE VOLUMES

VOL I

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INTRODUCTION

MEDICINE and mystery have been closely associated with each other throughout the entire history of the healing art. That art has existed as long as humanity itself. One of the very earliest written records known to exist, the Ebers Papyrus, discovered in Egypt in 1869, and dating from somewhere about 3500 B.C., is entitled "Book of the Preparation of Medicines for all the Corporeal Parts of Individuals," and gives a list of prescriptions and the diseases for which they are intended. Homer, who is said by some to have been born 900 B.C., contemporary with the prophet Elijah, and by others as early as 1200 B.C., before David was king, speaks of medical practitioners who visited patients for professional fees. He also refers to Æsculapius, describing him as the "blameless physician," of human origin.

Æsculapius was a pupil of one of the centaurs called Chiron, and was trained by him in the healing art. His medical skill became so great that he is said to have been able to restore the dead to life. There is a legend that Pluto, god of the infernal regions, fearing he would get no inhabitants for his realm, complained to Zeus, who killed the physician with a thunderbolt. Æsculapius was afterwards worshipped by the Greeks with his daughter Hygieia, and became the god of the healing art. Descended from him were the Asclepiades, a caste of medical priests who swore a solemn oath not to divulge the secrets of their profession.

In early times, in every country, medicine and religion were combined, and the art of healing was studied and practised by the priests.

Medicine and Religion. In Egypt every physician belonged to a sacerdotal college, and medical fees went to swell the revenues of the temples. Among the Israelites the rules of hygiene were administered by the priesthood, who also attended the sick. In India the sick were taken to the teachers of religion for aid, and the healing art was learnt from their religious books or Vedas, collected

writings probably dating back to 1500 B.C. Medical practice consisted in propitiatory sacrifice, prayer, and the employment of the sacred beverage soma. Soma was an intoxicating drink prepared from a plant, and was supposed to be the sustenance of the gods, and to have been sent by them to the earth for the cure of disease. It was stored for the use of the gods in the moon, of which the various phases were explained by the periodic replenishment of this precious beverage, which recalls the ambrosia and nectar of the Greek mythology.

The origin of disease has always been a subject of speculation and mystery, and in every nation, at some time or other, has been considered to be the result of sin. In ancient times, amongst the Hindoos, Chinese, Greeks, and Romans, disease was looked upon as a punishment sent by the gods, and it is easy to understand why the priests should have been the healers, and how the cure of disease apart from religious exercises should have been considered impious. A similar belief evidently existed amongst the Jews when they asked, "Who did sin, this man or his parents, that he was born blind?" In later days the great epidemics which swept over Europe were considered to be the sword of an avenging angel bringing punishment for the sins of mankind, and even in the so-called enlightened twentieth century the same belief in a modified form is held by Christian Scientists and others. In the beginning of time the common causes of death were, in all probability, accident and injury and the attacks of ferocious animals; but as soon as man by his superior intellect had to a great extent secured himself against these sources of danger he turned his hand against his fellow men. There are constant examples in history of severe epidemics rapidly following the devastations of war, and the sequence can hardly be looked upon as accidental, but is to be traced directly to contamination of the atmosphere by the emanations proceeding from unburied dead and to the infraction of many of the most essential laws of hygiene.

The story of the struggle of humanity against disease is full of romance. It is a history of progressive successes. Disease after disease has been met and vanquished. Many a time it has obtained such power as to sweep over and depopulate immense regions, but the power of intellect given to man and the increase of knowledge obtained by study and experience have triumphed, and one disease after another has fallen under the

Origin of Disease.

Conflict and Victory.

attacking power of preventive medicine. It is in the direction of prevention rather than of cure that the greatest victories have been gained, and the goal—never, indeed, to be fully reached—that is constantly before the mind is to obtain such a knowledge of disorders and their causes that preventible disease shall be removed from the face of the earth. The importance of the prevention of disease, as distinct from its cure, is recognised in the present work by the inclusion in it of a whole volume devoted to Health and the various means of preserving it.

One of the earliest, if not the most ancient of diseases is the plague. There is great probability that this scourge devastated the world in prehistoric times, but the first authentic outbreak was in **The Plague.** the sixth century A.D., when it spread over the whole Roman Empire and caused an enormous mortality. Gibbon the historian estimates that a hundred million persons died from the disease. The original starting place of the epidemic was Egypt, in which country the disease is endemic, and it formed a constant source of danger to Europe. In the fourteenth century, the pestilence extended from China to Ireland, and was called the "Black Death"; in the East it killed thirty-seven million persons, reached England in the summer of 1348, and London in the following winter, and stripped whole towns of their inhabitants. The last time it visited England in epidemic form was in 1665, when it was closely followed by the Great Fire. This terrible disorder has gradually withdrawn itself from this country and Western Europe generally. It is highly infectious and particularly virulent under the filthy and unhealthy conditions produced by ignorance of sanitary laws. By improving hygienic conditions, isolating individuals who are affected, and carrying out quarantine at our ports, we are now able to hear of the arrival of a plague patient in this country with equanimity, and never again do we expect to have to deal with an epidemic of this terrible scourge.

Typhus fever is another affection the virulence of which it is difficult for us to realise at the present day. It is particularly associated with filth and overcrowding, and at one time raged in **Typhus.** our prisons and was conveyed by the prisoners to the courts where they were tried. At the assizes held at Oxford in 1577, called "The Black Assizes," all who were present in court are said to have died within forty hours—the Lord Chief Baron, the sheriff, and above

three hundred others. But in this country "gaol fever" no longer rages in virulent epidemics, and its disappearance is due to the intelligence and energy of John Howard. He recognised that the disease was fostered and spread by a stagnant, impure atmosphere, overcrowding, and starvation; and by introducing a thorough system of ventilation into prisons and a more careful and humane treatment of prisoners, the disease has been all but eradicated and thousands of deaths avoided. But, sad to relate, the great philanthropist himself died of the disease from which he had protected so many others.

A younger and more lusty foe to mankind is cholera, which, although of little importance to us in these islands at the present time, is still a

Cholera. terrifying scourge to our fellow countrymen in India and to many Eastern nations. The disease has only been recognised for about two hundred years, though it had undoubtedly existed before. In 1817 a great epidemic broke out in India, and five thousand persons died of it in five days, and from its point of origin it spread gradually but surely over the world, reaching England in 1831 and America in the following year. In this attack it slew 20,000 persons in Great Britain, in 1849 53,000, in 1854 20,000, whilst in 1892 as many as 220,000 victims were carried off in Russia alone. But by careful hygienic precautions, especially the avoidance of decomposing material and overcrowding, the disease has gradually disappeared from our midst, and there seems no more reason to fear its return than that of the plague.

With the name of Edward Jenner and his introduction of vaccination is associated another wonderful victory over a dread disease.

Small-pox. Small-pox probably raged in the East in the remote past, and, there seems no doubt, existed in China two hundred years before the Christian era, but it did not arrive in England until the close of the ninth century. It has wrought terrible havoc, and carried off myriads of victims. In Mexico, which it reached in 1520, it is said to have destroyed three and a half million people. It has been calculated that if the mortality from this disease had continued to the present day at the same rate as before the introduction of vaccination, as many as 7,500 deaths in London, and 50,000 in England and Wales, would annually be caused by it.

Another victory over the hosts of death has been brought about by Pasteur and Lord Lister, through their discovery of the microbic origin

of the putrefactive diseases which complicate wounds. Not very many years ago the wards of our hospitals were full of the most serious diseases, which affected patients who had been subjected to operation. It was not at all uncommon in a surgical hospital for these troubles to spread from one patient to another, and from one ward to another, in the form of a terrible epidemic. For example, one of these diseases, called *pyæmia*, was the cause of death in 10 per cent. of all cases of amputation. In the surgeon's mind there was more dread of these terrible attacks than of the shock and danger of the actual operation, and not even the smallest and least important operation could be undertaken with a light heart.

Lord Lister showed that these diseases were caused by the entrance of putrefactive germs into the wounds, and that these germs were carried about from patient to patient by the air, or by the hands or instruments of the surgeon, and that the thousands of lives that were lost from these diseases were sacrificed to ignorance. Having discovered the cause, he was quickly able to find a means of prevention: he found that carbolic acid and other drugs were capable of destroying these germs, and hence they were called *antiseptics*. So originated the antiseptic method of treating wounds and performing operations, and the results obtained were very remarkable. The death-rate from severe operations in Lord Lister's wards in Glasgow from 1864 to 1866, before he had introduced his method, was 45 per cent., whilst from 1871 to 1877, after he had done so, it fell to about 12 per cent.

Again, the anti-toxin treatment introduced by Behring has robbed diphtheria of its terrors, and now there is a high percentage of recoveries from this dire disease. Two further triumphs will be sufficient to illustrate the advance of knowledge—namely, the discoveries that consumption and other forms of tuberculosis are due to a bacillus, and that malaria is caused by a microbe communicated by mosquito bite. These diseases are the cause of thousands of deaths annually, but those from the former have been already enormously reduced, and those from the latter, we can say with confidence, soon will be.

The knowledge that these diseases, and many besides, are produced by microbes or germs—which was only obtained by careful experiment and the aid of the microscope—has placed a powerful weapon in our

hands in the struggle with disease. It made thoughtful men wonder how anyone continued to enjoy health surrounded thus by hidden enemies, and convinced them of the truth of the long suspected idea that Nature has a strong tendency to retain the body in a state of health, and, when disease finds an entrance, to cast it out and restore the affected structures and organs to a normal state. It led to the discovery that a ceaseless war is being waged in our bodies between disease and certain protective organisms. So long as these guardians remain the conquerors the body continues in health, but immediately they are defeated the body suffers. Our blood consists of a fluid in which float millions of minute red corpuscles. These little particles are hard at work performing their duty, which is to carry the life-giving oxygen—the most

Workers. important constituent of the air—from the lungs to the furthestmost recesses of the body. But these workers are fitted for the labours of peace alone, and in no way do they act as defenders of the body from attacks of the army of germs. They occupy a similar place, therefore, in their community to that of the workers among the ants. But, like those intelligent insects, our bodies are also supplied with a fighting force, an army of soldiers or policemen, as it were. These are the white blood cells or corpuscles (leucocytes), and it is their duty to

Warriors. police the body and remove intruders whose presence is obnoxious, and to fight those who remain. When the germs of disease find their way into the blood by the many means of entrance that exist, they are immediately set upon by the white corpuscles, and—if all is as it should be—destroyed. The method of destruction is both strange and effective, for the white soldiers swallow the invaders and so effectually dispose of them, and the process of annihilation can easily be watched under the microscope. Hence they are called *phagocytes*, that is, cells which devour.

The knowledge of this fact led scientific research to seek for some means by which to assist the fighting force in its defensive efforts. It is evident that if anything can be done which will reduce the power of the disease-producing germs, or increase the power or the number of the defending army, the right side will be assisted in the struggle.

A singularly interesting discovery was now made which shows that Nature herself provides such assistance. In the fluid part of the blood, the plasma, there are substances which are virulently poisonous to disease microbes, although quite harmless to the blood cells and the

body generally. These substances, which exist in the blood of everyone, paralyse the microbes and make them tempting food for the white blood cells, and so they are called *opsonins*, from a Greek word which denotes the dressing of food. But the amount of opsonins present in the body varies; in healthy people it is nearly always the same, but in those who are in low or bad health it alters very much from day to day, and the measure of the amount is called the patient's "opsonic index," and can be accurately discovered by the expert. Now it is possible to increase this opsonic index or defensive power and produce an increased quantity of opsonins in an unexpected way, namely by injecting into the blood of the patient a dose of the very germs which are attacking him! This has been done in boils, acne, consumption of the lungs, and lupus, a skin disease due to the bacillus which causes other forms of consumption. For instance, in acne, a common disease of the skin, a number of the germs (called staphylococci) are taken from the patient and cultivated on a special jelly, until a good crop has grown; they are then killed by heat and injected under the skin. The dose of dead germs stimulates the organism to produce a large quantity of fresh opsonins, by which the living germs are paralysed, so that they fall an easy prey to the devouring leucocytes.

This progress is cheering. But there is much land still to be possessed. There are many deadly enemies still to be met. The time is far distant when every disease will be understood and its cause recognised. Influenza still sweeps over the land with epidemic virulence, and its cause remains a mystery; cancer still claims its multitude of victims without our being able to provide for them a sure means of escape; and sleeping sickness carries off its thousands of natives of tropical Africa.

As medical methods have changed, so, too, have medical men. If we picture the old physician of a century ago, with his full-bottomed wig and professional cane, in the head of which was a little box containing vinegar or other supposed health preserver, which was carefully applied to his nose to destroy infection whilst he was engaged at the bedside of the patient, and then turn to the physician of the present day, we can hardly believe that the two are separated by so short an interval. At the beginning of the nineteenth century the physician was courtly and impressive, filled with a sense of his own importance, somewhat pompous in manner, but undoubtedly skilful and experienced in the treatment

About
Opsonins.

The
old-style
Physician.

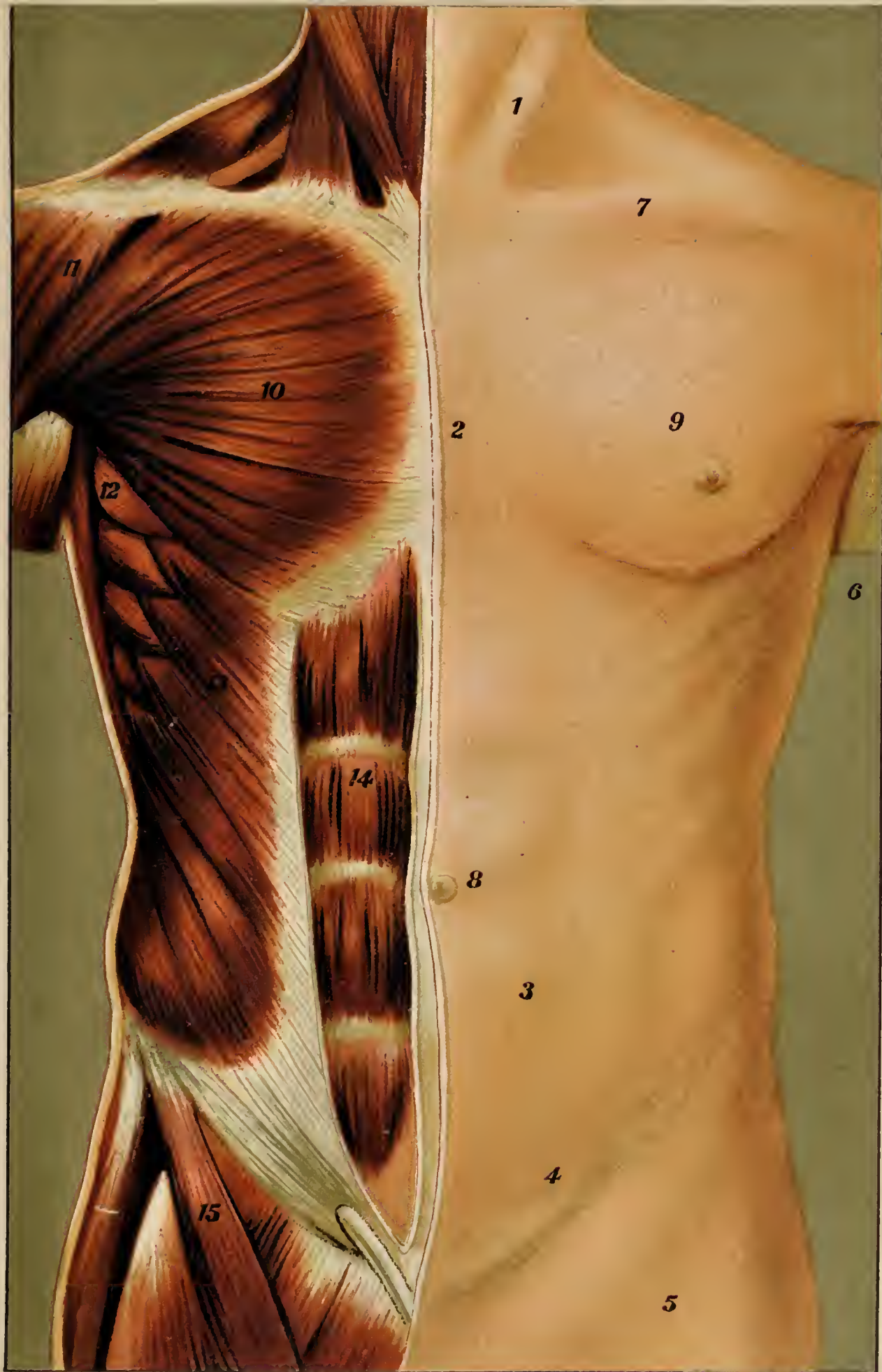
of disease as far as medical knowledge allowed. But his acquaintance with the nature and causes of disease was far inferior to that possessed by the average medical man of the present day. Such examination of the patient as was formerly made would nowadays be looked upon as most imperfect and perfunctory. But to compensate for this deficiency the powers of observation of doctors of the old school were highly trained and often most acute and accurate. The present-day physician examines his patient far more minutely and exhaustively, for he desires to probe far deeper into the causes of things, and his examination and cross-examination on apparently trivial matters may seem almost inquisitive and unnecessary to those who do not understand the significance of his questions.

From the foregoing remarks we can appreciate the importance of knowledge in connection with health and disease. It is of the greatest value to the community at large, for it leads to the carrying out in a public and national way of preventive measures. It is of equal importance to the individual, for although it is an excellent thing to have a good doctor to cure illness when it has come, it is decidedly more satisfactory to guard against disease by knowing its causes and the means of avoiding them. Many an illness might be altogether avoided by suitable measures of prevention, and many a serious attack much mitigated by judicious treatment applied early. There are many simple ailments, too, that can be treated without medical aid by those who care to acquire the very elementary knowledge which is all that is necessary.

It is with those aims in view that the following pages have been written. This work is not intended to qualify those who read it to treat serious complaints, but only those simple troubles for which skilled treatment is not necessary. Great danger might accrue, and even lives be lost, by dispensing with medical advice in grave illness; and it is almost a superfluity to utter a word of warning against such folly. However, as it may, in some cases, be impossible for those living abroad, or in remote country districts, to obtain skilled aid promptly, if at all, and as, moreover, when illness invades the household it is helpful to understand the causes which have produced it, the course it may be expected to run, and the reasons for the treatment prescribed, the more serious diseases, among them those of tropical climates, are included in the work as well as the simple complaints that are suitable for domestic treatment.

THE HUMAN BODY.

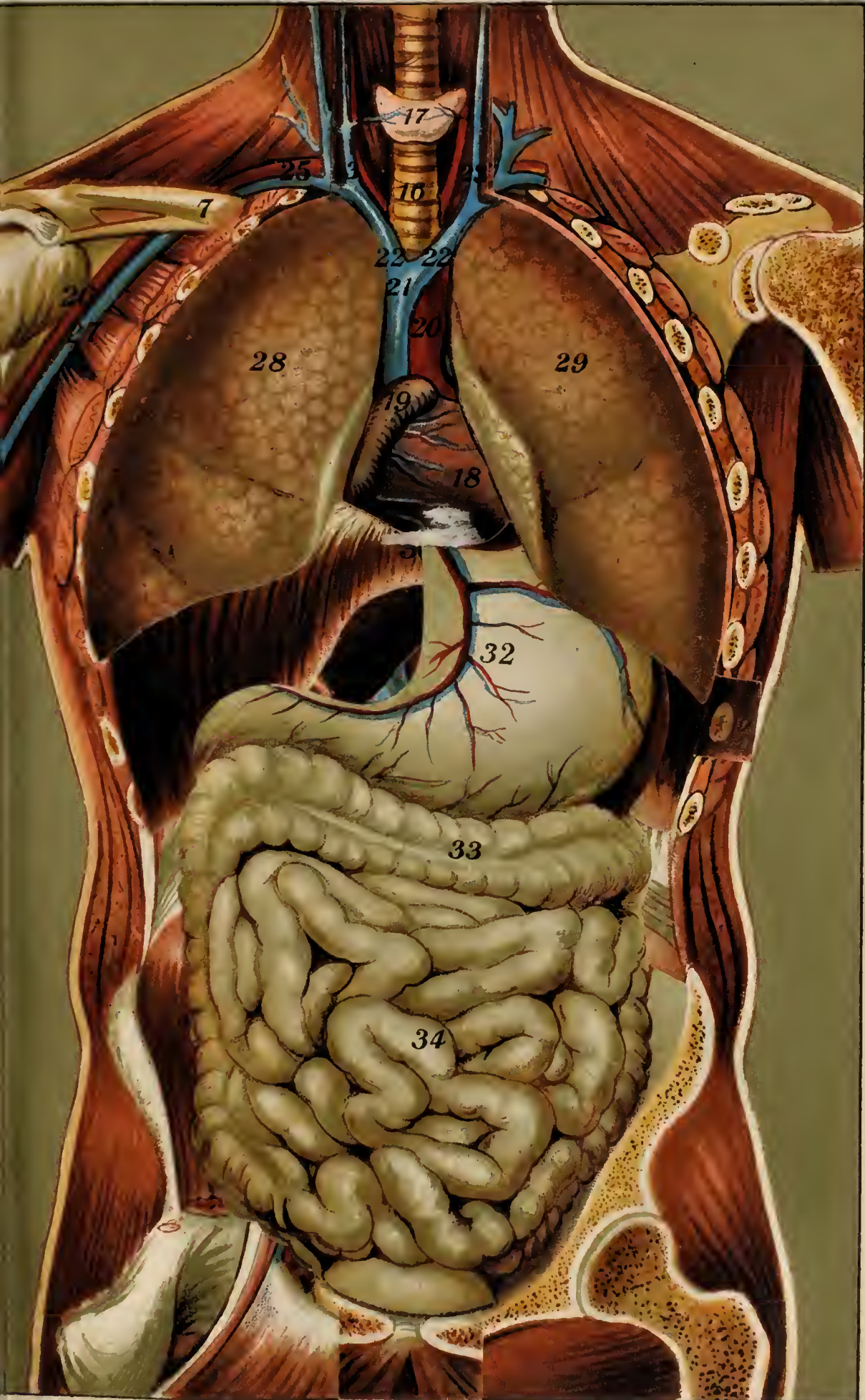
1. The neck.
2. The chest.
3. The abdomen.
4. The groin.
5. The thigh.
6. The axilla or armpit.
7. The collar-bone.
8. The navel or umbilicus.
9. The nipple.
10. The great pectoral muscle.
11. The deltoid muscle.
12. The serratus magnus muscle.
13. The external oblique muscle of the abdomen.
14. The rectus muscle.
15. The sartorius muscle.
16. The trachea or wind-pipe.
17. The thyroid body.
18. The right ventricle of the heart.
19. The right auricle of the heart.
20. The arch of the aorta.
21. The vena cava superior.
22. The innominate veins.
23. The internal jugular vein.
24. The carotid arteries.
25. The subclavian artery.
26. The axillary artery.
27. The axillary vein.
28. The right lung.
29. The left lung.
30. The diaphragm or midriff.
31. The liver.
32. The stomach.
33. The large intestine.
34. The small intestine.
35. The œsophagus or gullet.
36. The gall-bladder.
37. The ascending aorta.
38. The vena cava inferior.
39. The right kidney.
40. The left kidney in section.
41. The right suprarenal capsule.
42. The left suprarenal capsule.
43. The right ureter.
44. The left ureter.
45. The bladder.



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THE HUMAN BODY.





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THE PEOPLE'S PHYSICIAN

PART I

DISEASES : THEIR CAUSES, SYMPTOMS, AND TREATMENT

CHAPTER I

GENERAL DISEASES

Rheumatic Fever : Incidence of the Disease—Symptoms—Complications—Treatment. Chronic Rheumatism : Symptoms—Treatment. Muscular Rheumatism : Lumbago—Pleurodynia or Side-Ache—Wry Neck. Rheumatic Gout : Cause—Symptoms—Treatment.

IN our first two chapters we propose to deal with diseases which are not limited to any one particular organ but are rather of a general character, beginning with

RHEUMATIC FEVER

Acute rheumatism, or rheumatic fever, is one of the most severe, and at the same time one of the most frequent diseases in countries where the climate is damp and cold, and the variable climate of the British Isles is eminently suitable for its production. The commonest and almost the only way in which an attack of the disease is brought on is exposure to cold or wet, and it is natural, therefore, that the great majority of cases occur in the cold and wet months of the year. But a certain number of attacks come on in the hot summer months. This is explained by the dangerous habit that people have of exposing themselves to chill when overheated after exercise. Sitting when warm in a cold room, sleeping in damp sheets or upon the damp ground, are common ways of exciting the disease. Some people are peculiarly liable to acute

rheumatism ; it is undoubtedly one of the hereditary complaints, in so far that persons whose parents have been sufferers from it are always liable to attacks, when exposed to its usual causes, and

Incidence of the Disease. it is common to find several members of a family showing this proclivity, the only explanation being inherited predisposition ; indeed, the tendency may be so strong that an attack may come on without any apparent exposure to an exciting cause. One attack also strongly predisposes to others, and unless those who have once fallen victims are very careful of themselves, any slight chill may cause a repetition. Acute rheumatism also commonly follows an attack of scarlet fever.

Rheumatism is one of the diseases most frequently met with in young and otherwise healthy individuals, the great majority of cases, in both sexes, occurring between the ages of sixteen and twenty-five. However, no age can be considered quite exempt. As can be well understood, the poor are especially affected, from their constant exposure to the weather in their out-of-door laborious life, often perhaps with scanty clothing. From his greater exposure to weather, the working man is more frequently affected than his wife. Many an attack, in those predisposed, can be traced to indigestion brought on by indiscretion in food, by which much waste material collects in the body and renders it more vulnerable to exposure to cold. Anything also that lowers the general health or causes mental depression, produces a condition of the system peculiarly open to attack. Rheumatism has a special tendency to involve the weak points in the body, and often it first appears in some joint which has been previously sprained or injured.

As to the ultimate cause of the disease, there seems to be a very strong consensus of opinion that it is produced by the presence of a special microbe, which has been called the *Micrococcus rheumaticus*.

Cause. This germ has been found in the blood and in the affected joints of rheumatic persons ; it has been cultivated, and when injected into the blood of rabbits has produced symptoms similar to those of rheumatic fever, such as swelling of the joints and heart complications, and the complaint is classified by the Royal College of Physicians amongst the infective diseases, that is, diseases due each to its own special poison.

The symptoms of rheumatic fever are very characteristic. A young man in good health gets thoroughly wet and chilled, he feels aching all

over, has pain and stiffness in his joints, complains of feeling chilly and generally ill, with sore throat and headache, has restless nights, and after

two or three days wakes up one morning in high fever.

Symptoms. One or more of his large joints are severely painful, and rapidly swell, and he is quite unable to get out of bed or even move himself. He lies in bed on his back helpless, and avoids moving any part of his body because of the pain which the slightest movement gives him. His whole body becomes soaked with sour, strong-smelling sweat, his face is flushed and heavy, his expression that of pain. If the painful joints are examined they will be found to be swollen, red, hot, and excessively tender. The various symptoms which accompany fever are most evident—great thirst, loss of appetite, dirty and furred tongue, quick full pulse, high-coloured scanty urine, which becomes thick on cooling.

Such is rheumatic fever, and in this condition the patient may remain for an indefinite period, the only variation in his condition being due to the shifting of the pain from one joint to another. This change goes on from day to day, until perhaps all the larger joints have had their turn.

After a time the symptoms gradually disappear, and the disease seems to have worn itself out. The joints get better, but remain for some time stiff, and painful when moved, the sweats subside, the fever gradually abates, and the patient day by day grows more comfortable and happy, and in course of time passes on to convalescence.

This is a simple, uncomplicated case of acute rheumatism, but unfortunately many complications are likely to arise, and it is only by the utmost care, and by using the proper treatment without delay, that it is possible to prevent their occurrence, and even with the observance of the utmost precaution a certain proportion of attacks run on to serious complications.

Very high fever sometimes complicates an attack. In an ordinary case the temperature rises to 99° , or even—when many joints are affected at once—to 102° , but in a certain number of cases it rises higher and higher, until the patient's condition becomes most alarming. If the general signs of fever show a marked increase, or the pain disappears, the sweats cease, or delirium occurs, a careful observation with the thermometer should be made, and if the temperature has risen to 103° , or higher, the various methods of treatment mentioned under the heading of hyperpyrexia should at once be employed.

The pain is sometimes beyond all bearing ; it is always very great, and is the most distressing of all the symptoms. The patient's attitude is entirely due to his attempts to put himself, as far as possible, in an easy position ; he lies, as far as his restlessness will allow him, perfectly motionless in bed, on the flat of his back with his legs stretched out, and his arms folded across him, and the only parts of him which move are his eyes, for he watches the movements of those around with real terror, for fear they may move the bed in passing round it, or shake him in any way. The most painful attacks occur in high-strung nervous people, and those of excitable temperament.

It is the larger joints which are chiefly involved in the disease, especially those of the legs, the knees being the favourite joints, then the ankles, after these the wrists, shoulders, and elbows ; the fingers and toes are rather less frequently affected, but in a bad attack pretty well all of these may suffer in turn. This is one of the points of distinction between rheumatism and gout, and also between rheumatism and a disease called rheumatic gout or rheumatoid arthritis. In acute gout the poison expends its energy almost entirely on a single joint, which for choice is that of the big toe, whilst in rheumatoid arthritis it is the small joints of hands and feet that are most liable to be affected, although it is not by any means likely that they will alone suffer.

It is a great comfort to know that an ordinary straightforward case of rheumatic fever is not very dangerous in itself, for very few people die from the excessive pain, or sweating, or fever ; but **Complications.** it is impossible to tell which cases will run the simple course, and which will be complicated. Probably as many as 50 per cent., that is one in every two cases, are complicated in one way or another, and the only means we know at present to guard against these serious symptoms is to start treatment as early as possible, and to take the utmost care to guard against cold, exertion, or indiscretion of any kind. The most frequent complications are those that affect the heart, the next those of the lungs. The complications which affect the heart are due to inflammation of the various parts of its lining and valves, or *endocarditis* ; of the surrounding membrane, or *pericarditis* ; and of its muscular walls, or *myocarditis*. There are also other conditions, such as palpitation and great rapidity of pulse. These complications are much more commonly met with in children and young people, and seldom in those over thirty years of age. Women

are more subject to them than men. The chief cause, if cause there be, is neglect of proper treatment, and want of care. Complications are the chief dangers of rheumatic fever, and cause the majority of deaths from that complaint.

Inflammatory affections of the respiratory organs, such as pneumonia, pleurisy, and bronchitis, are also not uncommon, and here again the means of preventing them are extreme care and proper treatment.

The treatment of so severe an illness as rheumatic fever without a doctor would hardly be undertaken by anyone who could possibly

Treatment. help it, but it is sometimes necessary for an unskilled person to attempt it, and the following directions should then be very carefully followed. If possible, a skilled nurse should be obtained, as the patient is more helpless, when suffering from a severe attack, than in almost any other complaint. He is in such pain, and his joints are so tender, that it is difficult to touch him without increasing his suffering, so that the greatest gentleness is necessary. He is unable to get out of bed for any purpose, and even if he were able, it would be very unwise to allow him to do so; for not only does movement always make the pain worse, but there would be great risk of his getting chilled. He should be kept, therefore, as still and as quiet as possible. His bed should be strong and firm, so that movements in it are easy; it should be narrow, and placed out in the room, so that any part of his body can be reached, and it should be out of all draughts. The sheets should be removed, and the patient laid between blankets, and dressed in a woollen night shirt. This should be split from top to bottom up the front, and from neck to cuff along the seam of the sleeve, so that any part of the body can be uncovered for washing, or to apply treatment, and tapes should be stitched on to fasten it up. The copious perspiration will require occasional changing, not only of the night shirt, but also of the blankets, and this must be done with great care, and not more often than is absolutely necessary.

The local treatment must be directed to the relief of the pain in the joints, and to the patient's general comfort. The limbs must be kept completely at rest, in as comfortable a position as possible. Each joint should be covered up with a thick layer of cotton wool, kept in position by a firm but not tight bandage; some doctors keep the inflamed joints at rest by fixing a splint on the affected limb. The cotton wool should

be changed when it gets very wet with the sweat, and before re-applying the wool, the joint should be sponged with warm water and soap, or carbonate of soda. Sedative applications may be employed to ease the joint pains, such as the following, which are equally efficacious:—

PREScription 1

Extract of belladonna and glycerine. $\frac{1}{2}$ an ounce of each.
To be smeared over the joint and covered with wool.

PREScription 2

Tincture of belladonna	2 drachms.
Tincture of opium	2 drachms.
Liniment of chloroform	1 ounce.

Make a liniment. To be sprinkled on lint, and laid on the joint under cotton wool.

Hot fomentations also often give great relief to the patient, and may have some of the sedative liniment sprinkled on the flannel, after it is wrung out of hot water. They should be applied as gently as possible without moving the joint, and as hot as can be borne. Sometimes blisters ease the pain. They should be produced by painting on blistering fluid with a brush at various points around the joint, about the size of a crown.

Another method of treatment which is coming into vogue is to apply drugs to the joints in the form of ointment or liniment. One of the most useful of these is a preparation called *mesotan*, which contains salicylic acid.

PREScription 3

Mesotan	} $\frac{1}{2}$ an ounce of each.
Olive oil	

or

PREScription 4

Mesotan	2 drachms.
Vaseline	6 drachms.

To be painted on the joints and covered with cotton wool, but not with any waterproof material.

In using mesotan, moisture must be avoided, and the joint carefully dried from perspiration. The skin must not be rubbed. Mesotan is found especially useful in relieving the pain after the fever has somewhat subsided.

Next we must consider the medicines we should give.

Some years ago, Dr. Maclagan, remembering the wonderful effect of quinine (obtained from cinchona bark) in ague, suggested the use of *salicine* for rheumatism. It was tried, and found most useful, and has since been adopted as almost the routine treatment. Salicine, prepared from the bark of the willow, is a powder of white scaly crystals; and has an intensely bitter taste. It passes through the body and appears in the urine as oil of spiræa, or meadow-sweet, which gives off a peculiar odour. Salicine, salicylic acid, and salicylate of soda are all used for the treatment of rheumatism, and although they cannot be looked upon as specifics (that is, a certain cure), they are almost so, and have proved of immense benefit in the treatment of all rheumatic affections. The chief objection to their use is that when given in large doses they cause symptoms of poisoning, which it is well we should know, and be able to recognise, as their occurrence necessitates the discontinuance of the drug, or at any rate a great diminution of the dose.

These symptoms are a tendency to vomit (partly due to the curious sweetish taste when it is salicylate of soda which is being taken), and a singing and buzzing in the ears, with deafness, probably caused by the action of the drug on the nervous system. Sometimes, though more rarely, the sight is affected, and the patient has disagreeable visions when the eyes are shut, or even occasionally with them open, and this without any delirium.

Either of the following is a useful prescription for administering salicine and its preparations in rheumatic fever:—

PRESCRIPTION 5

Salicine	2 drachms.
Bicarbonate of potash	2 drachms.
Tincture of orange	$\frac{1}{2}$ an ounce.
Chloroform water to 8 ounces.	

An eighth part to be taken every 2, 3, or 4 hours.

PRESCRIPTION 6

Salicylate of soda	2 drachms.
Bicarbonate of potash	2 drachms.
Bromide of potash	80 grains.
Compound tincture of cardamoms	$\frac{1}{2}$ an ounce.
Spirit of chloroform	$2\frac{1}{2}$ drachms.
Water to 8 ounces.	

An eighth part to be taken every 2, 3, or 4 hours.

A dose of either of these, the second being specially recommended, may be given every two hours, until the temperature begins to fall and the pains are relieved, after which the intervals between the doses are gradually increased to three, four, or six hours, and the medicine should be continued for some days, three times a day, to prevent any return of the symptoms.

Salicine and salicylate of soda may also be taken in the form of tabloids, containing 5 grains each.

Aspirin is another useful drug for rheumatism which has recently been introduced; it is a derivative of salicylic acid.

The dose is 10 to 15 grains for an adult, and 3 to 5 grains for children. It should be given every three or four hours, dissolved in lemon water or cold milk, as it does not then irritate the stomach and upset the digestion, which is the chief objection to it.

If these drugs for any reason cannot be borne, the old treatment by *alkalies* should be adopted in the following form:—

PRESCRIPTION 7

Bicarbonate of potash	.	.	.	$\frac{1}{2}$ an ounce.
Solution of acetate of potash	.	.	.	1 ounce.
Tincture of lemon	.	.	.	$2\frac{1}{2}$ drachms.
Chloroform water	to 8 ounces.			

An eighth part to be taken every 4 hours, adding to each dose a powder of citric acid, 10 grains.

This should be continued for twenty-four hours, and then the doses should be taken at less frequent intervals.

The patient should be encouraged to take plenty to drink. Effervescing potash or soda water, with milk or lemon juice, is good, or even plain water. Lemon juice was at one time supposed to be directly curative; it is at any rate decidedly beneficial. Some alcohol, brandy or whisky, may be required to counteract the exhaustion and great depression. The bowels must be kept regular by ordinary aperients. If diarrhoea occurs lime water will be found useful.

The diet is that of ordinary fever (as described in the chapter on Fevers), fluid nourishment in small quantities, and at short and regular intervals night and day.

During convalescence tonics are necessary, especially quinine. The patient should be kept in bed several days after all pain and fever have disappeared. Great care must be taken to avoid cold and fatigue.

Warm woollen clothes should be worn, sudden changes of temperature avoided, and exercise only started very gradually.

CHRONIC RHEUMATISM

Is produced by the same causes and occurs in the same subjects as acute rheumatism, and is often the sequel of an attack of that malady.

Symptoms. Its chief symptoms are pain and stiffness of the joints and surrounding structures, pain and stiffness which come and go, getting better or worse according to the weather or to the habits of the patient. The pain, always worse in cold, wet weather, and when the body becomes warm in bed, is severe aching of a most wearing character, which makes the affected limb feel weak and powerless. It is relieved for the time by exercise, but is always worse afterwards ; the popular idea that it can be "worked off" is therefore a delusion. The affected joints creak and crack when moved, whilst in the worst cases and in the later stages they become both deformed and stiff. The seat of pain is in many cases dependent upon some strain or sprain, which makes the part weak, and so more vulnerable.

Much can be done to relieve, but practically nothing to cure, this complaint. It is often lifelong in duration, but there may be protracted intervals of improvement, followed by worse attacks. It does not kill, but often disables from work, and is a complaint that lands many otherwise healthy working-men in the workhouse, there to end their days.

The local treatment consists in counter-irritation by painting the affected parts with iodine, or by applying blisters, or in easing the pain by sedative applications of opium, belladonna, or chloroform, as recommended for acute rheumatism. Rubbing the parts gives relief ; compound camphor liniment, soap liniment, or turpentine and acetic acid liniment, are all useful for this purpose ; very hot fomentations are also comforting.

The general treatment consists in avoiding cold and damp, moving to a warm climate, wearing warm woollen clothes, avoiding exertion and taking a nourishing diet. As Dr. Burney Yeo writes in his "Manual of Medical Treatment," the "digestive peculiarities of individual patients must be observed, and as nutritious a diet prescribed as is consistent with the maintenance of normal digestion. Whatever food tends to cause assimilative difficulties, a good test of which is the occurrence

of deposits of lithates in the urine, should be prohibited. Fresh tender meat, poultry, game, and fish in strict moderation; fresh vegetables, stewed celery, Spanish onions, lettuce, watercress, broccoli, and ripe cooked fruits; rice, tapioca, and other farinaceous foods; butter, cream, milk; all these are admissible, provided that there is no digestive peculiarity which might cause any of them to disagree. A purely vegetarian diet has been found suitable by some patients. Fermented alcoholic drinks are best wholly avoided. Home-made lemonade and plenty of pure water are the best beverages."

The most useful drugs are tonics, especially iron and cod-liver oil. Iodide of potash gives relief from pain, especially the aching at night, and should be taken in 3-grain doses twice or three times a day, one dose always at bedtime.

Salicine and its preparations also help, but should be taken in smaller and less frequent doses than for the acute affection. Aspirin, too, in 10-grain doses, and guaiacum and sulphur in the form of a lozenge, can be recommended. Finally, residence at some watering place, at home or abroad, should be tried, as circumstances permit. Much benefit may be obtained from drinking the waters at suitable spas, and from the baths, massage, and careful regime in diet and exercise.

MUSCULAR RHEUMATISM

As its name implies, this malady consists of pain in the muscles due to a rheumatic condition of the system, and it is chiefly met with in those who are prone to rheumatic affections in general. No age is exempt, not even childhood. It may affect any part of the body. A person of rheumatic tendencies sits in a draught of cold air, and the part chilled becomes painful, stiff and powerless. Very often the attack comes on with a little fever and some soreness of the throat, and the pain in the muscles follows, growing gradually more and more severe. The pain is only felt when the muscle is used, and during rest gives no trouble. If the part be examined the muscle is found to be hard, in a state of spasm, and very tender.

Any part of the body may be involved, but there are several favourite sites which require special notice.

1. *Lumbago* is a form of muscular rheumatism which affects the large muscles of the back and loins. Although a certain amount

of pain in the back is usually complained of for some days previously, yet it is not at all unusual for this complaint to come on quite sud-

Lumbago. denly, any muscular effort, such as rising from the stooping

position or lifting a weight, bringing on a violent pain in the loins, sometimes so suddenly that the sufferer may look round to see who has struck him. The pain is very acute, and is due to a spasm of the large muscles which raise the body from a bending position, and support it in an erect position. It is often so severe that the sufferer finds it impossible to remain out of bed. There is decided tenderness on pressure over the affected part, but very little fever or other general symptoms of illness. It is always best to go to bed when attacked by lumbago, for though it may be still possible to walk about half doubled up, it is not easy for the proper remedies to be applied, except in bed.

The medicinal treatment is similar to that for acute rheumatism. If the patient has given up the attempt to crawl about, and taken to

Treatment. bed, he should try the salicylate of soda mixture (Pr. 6)

advised for that complaint; otherwise the salicine mixture (Pr. 5) is safer.

Local measures are of the first importance. In the worst cases nothing stops the pain like a morphia injection—which must be given by a doctor—under the skin of the back; but relief can be obtained in milder cases with a little patience. Put a linseed poultice over the whole painful area as hot as can be borne; you may sprinkle the poultice with mustard to make it more effective. An equally good result will be obtained by a flannel wrung out of boiling water laid over the back, and covered over with waterproof material to make a compress. If the pain is not very acute relief can be obtained by sedative applications, such as equal parts of extract of belladonna and glycerine, smeared on and covered with wool (Pr. 1), or by rubbing in equal parts of belladonna and chloroform liniments. As the pain lessens and the patient is able to get about, the treatment can be continued by applying a good-sized porous belladonna, opium, or menthol plaster. The Turkish bath is found most useful in the later stages of lumbago, and in all cases of chronic rheumatism, whatever part of the body is affected. By this means the skin is made to act freely, and the copious sweats carry off the rheumatic poison; the warmth and perspiration also relieve the pains and aches. An electric battery should be tried in obstinate cases, either the galvanic or faradic current being used and applied as strongly as can be borne

without pain, all over the affected part. Sometimes under this treatment the pain disappears as if by a charm.

After an attack of lumbago the patient should dress warmly, adopting woollen underclothes ; he should avoid all risk of damp and cold, and should not take much muscular exertion for fear of bringing back his vanished enemy. Tonics are beneficial during convalescence, and lastly, in obstinate cases, change of air and scene, to some watering place, where a course of waters and baths can be obtained, will probably bring about a cure.

2. *Pleurodynia* or *side-ache* is another form of muscular rheumatism. A sharp pain is suddenly felt in the side of the chest, as the result of a cough or sudden movement. It may be only slight, and pass off rapidly, but occasionally it is really excruciating and feels as if a knife were being stuck into the spot. It forms one variety of "stitch in the side," another being due to pleurisy ; in both complaints it is impossible to take a deep

Side-ache. breath, and the breathing is carried on in a short, quick, constrained way, with the body bent over to the painful side. To recognise one from the other is not easy for anyone who cannot use the stethoscope, but by this instrument a doctor can easily distinguish between the two, for in pleurisy he hears a sound called a friction rub, but there is no sound at all in pleurodynia, which is only a pain in the muscle between the ribs and quite outside the chest.

It is well to take the temperature, and discover if there is any fever present, for if there is it is a point in favour of the pain being due to pleurisy, and if there is not it is more likely to be pleurodynia, though it must not be forgotten that pleurodynia may be part of a cold or slight rheumatic attack, in which case fever might be present.

If the movement of the ribs is controlled the pain ceases, and this can be done by fixing the side with straps of plaster about two inches wide and overlapping each other about a quarter of an inch. The **Treatment.** plaster should cover the painful spot, and extend from the middle line at the back to the middle line in front ; that is, it should encircle half the girth of the chest. Any plaster will check the movements of the ribs, but belladonna plaster is best, as it also soothes the pain.

3. *Wry-neck* or *stiff neck* is due to a painful spasm of the muscle on one side of the neck, and is chiefly met with in young people. The head is drawn downwards and backwards on the affected side, whilst

the chin is turned towards the other shoulder, causing the sufferer to assume a very characteristic attitude.

It is well to start treatment at once, as the earlier this is begun the shorter will be the attack. Neglected cases are very difficult to cure, and may pass into a chronic condition lasting for months.

Wry-neck.

Give a good purge, and start the salicylate of soda mixture, recommended for acute rheumatism (Pr. 6). This will necessitate the patient keeping indoors, which indeed he will in any case have to do if the pain is severe. If the pain is not bad enough to prevent him from going out, he may use the salicine mixture (Pr. 5).

Local treatment consists in hot fomentations to the neck, applied over some sedative preparation such as equal parts of extract of belladonna and glycerine, which should be smeared over the painful part. In severe cases it may be necessary for a doctor to be called in to administer an injection of morphia, as this often gives very rapid relief.

As the pain subsides and only stiffness remains, use as an embrocation equal parts of belladonna and chloroform liniments, wrap the part up warmly with flannel or cotton wool, and give some of the bark tonic (see the chapter on Drugs and Prescriptions), with a couple of grains of iodide of potash in each dose.

RHEUMATIC GOUT

Is an affection somewhat similar to chronic rheumatism, but it is really a distinct complaint and different in its origin from both rheumatism and gout, being neither the one nor the other; its name is therefore misleading, and it is better to call it by its less used but more correct title of *arthritis deformans*, that is, an inflammation of the joints producing deformity. The causes of this complaint are still unknown; there is a distinct tendency for it to be inherited;

Causes.

it often occurs in those who suffer from rheumatism, either acute or chronic; by some medical men it is supposed to be infective, that is, due to a poison in the system, and the poison is believed by some to be produced by microbes. It is met with in persons of all ages, but usually begins in the middle-aged, between twenty and forty years, and is said to be most common in women. There seems little doubt that all depressing conditions which lower the vitality of the body tend to produce it, and they must be looked upon as predisposing causes. Amongst these we may mention worry and

anxiety, overwork, both mental and physical, the bearing and rearing of large families, and too protracted nursing of infants.

The course of the disease is very prolonged, one joint after another becoming swollen and painful, but those once affected never quite

Symptoms. recover their healthy condition ; for though the swelling

and pain may slowly pass off, some stiffness, creaking and deformity are left. In this way many joints become diseased. The pain is very distressing and continuous, is gnawing or aching in character, and is somewhat increased by movements of the joints. The stiffness, the cracking and creaking on movement, and the deformity of the affected joints are peculiar to the disease, and the last is sometimes so marked as to have given rise to the names "nodosity of the joints," and "arthritis deformans" ; it is produced by bony outgrowths which form around the joints, and which when once formed never disappear. The finger joints are often affected, and the fingers become twisted, knobbed and partially dislocated ; the wrist gets swollen and lumpy ; and even the spine may grow stiff and twisted.

As the joint trouble grows worse the patient's health suffers, he becomes weak and pale, with dry skin and cold, blue feet and hands ; the pain and deformity render exercise impossible, and the sufferer gradually becomes helplessly bedridden. This is a gloomy picture to draw, but in spite of the general misery the disease seldom causes death, although hope of ultimate recovery is small unless the disease is well and properly treated at quite an early stage.

To treat this complaint aright we must distinguish it from rheumatism and gout. The peculiar deformity of the joints occurs in neither of these

Treatment. maladies, and in both the patient is at times quite free from

illness, but in "rheumatic gout" the disease is continuous, and joints once affected never get quite well. In gout also often one joint only is involved, especially the big toe, uric acid is common in the urine, and chalk stones appear in the ears and affected joints. The treatment of arthritis deformans is, as we have said, the more promising the earlier it is commenced. The general health must be maintained, and everything avoided which can lower the system. With this purpose in view cod-liver oil should be taken regularly, either alone or with 20- or 30-drop doses of syrup of iodide of iron. Other preparations of iron are also useful, especially when combined with arsenic. Arsenic is indeed believed by some to be the most efficacious drug ; it should be given in small doses,

and continued for a long time. The following mixture is recommended :—

PRESCRIPTION 8

Syrup of the iodide of iron	. . .	2½ drachms.
Solution of arsenic	. . .	24 drops.
Syrup of orange	. . .	2½ drachms.
Water	to 8 ounces.	

An eighth part to be taken 3 times a day, after meals.

It must be borne in mind that arsenic is a strong medicine, and cannot be borne for any length of time by some persons.

Local treatment is sometimes of benefit. Iodine should be painted over the affected joint until the skin begins to peel, and blisters may be applied. Hot fomentations should be tried with massage, and friction of the joint with turpentine and acetic acid liniment. Iodide of potash ointment smeared over the joint night and morning and covered with a flannel bandage has been found useful, and mercury ointment or mercury strapping can be strongly recommended. Whichever measure is employed the affected joints should be well covered with cotton wool or flannel bandages.

A certain amount of exercise should be taken to overcome the stiffness of the joints, but not enough to increase the pain. The diet, like that recommended for chronic rheumatism (p. 17) should be nutritious, and contain plenty of the fatty foods, and be taken as liberally as the digestion can manage. The clothing should be warm, and cold and damp avoided most carefully. In this complaint the greatest benefit can often be obtained from spas, with treatment by baths and waters, and from wintering in a warm climate.

CHAPTER II

GENERAL DISEASES (*concluded*)

Gout, Acute and Chronic—Irregular Gout. Cancer : How Tumours are Classified—Cause—Symptoms and Course—Treatment. Tuberculosis : The Tubercle Bacillus—How the Disease is Transmitted—General Tuberculosis—Local Tuberculosis. Anæmia—Hæmophilia—Exophthalmic Goitre—Myxœdema.

GOUT

GOUT is a disease with which we are all familiar, for there are few families in which there is no member who suffers from the complaint. It is an ancient disease, and was well known to the Greek, Roman, and Arabian physicians. The disease has indeed received its name from the Greek word *gutta*, meaning “a drop,” adopted because of the theory that an attack of gout was due to the distillation “drop by drop” of a noxious fluid into the structure of the joints. The theory was so generally held that the same word occurs in the German, French, Italian, and Spanish names for gout. The Greeks had special names for the disease, according to the parts affected by it, *podagra*, *chiragra*, *gonagra*, meaning a seizure in the foot, hand, and knee respectively.

The influence of inheritance is as strongly shown in this complaint as in any we know. Curious instances are related in which nearly all the members of a family have suffered from gout. For instance, three brothers and a sister out of six children all suffered severely, and in another family of six members, four brothers suffered from very aggravated attacks, and only the two sisters escaped. It must in this sense be looked upon as a family complaint. That women enjoy a great immunity from gout is notorious, and is probably due to their more temperate habits.

The first onset of gout is generally between the ages of thirty and forty, and when it occurs earlier than this it is usually in those whose family history shows an exceptionally strong predisposition. Even boys at school may in such circumstances be sufferers.

Although a gouty tendency is in so many cases a condition present at birth, yet it is quite possible for the disease to be acquired by an absolute indifference to hygienic rules and systematic indulgence

Causes. in the pleasures of the table. In these cases of acquired gout (which come on later in life than the inherited form), the children born previously are free from gouty taint, whilst those born subsequently are liable to be affected. Habits of life are of the utmost importance in the development of the disease, especially high living ; great consumption of animal food, habitual use of intoxicating liquors, and sedentary habits all being prominent predisposing causes. These conditions are mostly found in the wealthy and independent classes, and gout is a disease especially liable to be met with amongst them. It is said that as a class agricultural labourers are wonderfully exempt from gout, and these men are, from necessity, sparing in the use of animal food, of temperate habits, and all day long at work in the fields. There seems little doubt that a large consumption of animal food tends to produce an excessive amount of uric or lithic acid in the body, and it is now generally acknowledged that this acid is the cause of gout. In gouty persons it is found in excess in the blood, it is excreted in large quantities from the kidneys, and in combination with soda it forms the "chalk stones" and deposits so constantly found in the gouty.

That excess in alcoholic drinks produces gout is proved by everyday experience, and this is especially true of the stronger and heavier wines and of malt liquors. The worst wines for gouty subjects are port—par excellence—Burgundy, Madeira, sherry and Marsala. The effect of spirit-drinking in producing gout is not nearly so marked. Wine-drinking is not only a predisposing cause but is a direct exciting cause, as some examples given by Sir C. Scudamore will show. He mentions the case of a person of no gouty inheritance who, after three or four days of excessive conviviality in which he drank champagne very freely, was attacked severely by gout. Another man quite without any predisposition, after committing the extraordinary excess of drinking four bottles of port at a sitting, was attacked the same night, and for the first time, by gout. Sedentary habits, due to occupation, or merely to indolence and laziness, are sure to promote the gouty disposition. This is probably because healthy bodily exercise is most efficacious in stimulating the action of the excretory organs, especially of the kidneys and the skin, and thus carrying off all waste material, including the gouty poison.

The presence of lead in the body, whether introduced in the drinking water, through its use in work, or from other sources, has been proved to be a powerful predisposing cause of gout. The disease is also most prevalent in cold, damp and changeable climates, and is hardly known in the tropics. Lastly, as an exciting cause we must not forget to mention the effect of injuries. A strain or sprain of a joint in a gouty subject is very liable to be followed by an attack of the disease in that joint. Any joint in the body may be affected by gout, but the favourite spot is the big toe joints.

Having now discussed pretty fully the causes of gout, and thus obtained a knowledge of what conditions to avoid in its preventive treatment, we must consider the disease itself.

Gout assumes many forms. It may occur (1) as an acute disease affecting one or many joints, and may then be called "regular gout," or (2) after many acute attacks it may settle down in various joints as a condition of "chronic gout," or (3) it may affect certain internal organs, and is then termed "irregular or suppressed gout."

The first fit of acute gout may be preceded by a few days of slight derangement of health, but it is more frequently quite sudden in its attack. A man goes to bed feeling in his usual health, and is awakened soon after midnight by excessive pain in the joint of his big toe. He is restless, hot and feverish, tosses about in his attempts to get comfortable and to go to sleep. Finally, after some hours of restlessness and suffering, the pain quite suddenly gets less, he breaks into a free perspiration, and about the time he ought to be thinking of getting up he falls asleep. On waking he finds the affected joint red and swollen, exquisitely tender, and with the skin over it shiny and tense. It is impossible to put the foot to the ground, for the slightest pressure causes great pain. The pain is variously described as burning, throbbing, or aching. The local condition is accompanied with symptoms of fever, the temperature is raised though not very high, there is chilliness or even a rigor, loss of appetite, thirst, furred tongue, and constipation, with a diminished quantity of high coloured urine, which becomes thick and reddish on standing. During the day the pain is better, but it comes on again with renewed violence during the night. After four or five days to a week of suffering the attack passes off, the joint being left stiff and painful, and the skin over the affected part swollen and peeling. Finally after first attacks

all signs of gout disappear, but the disease shows a characteristic tendency to return, and unfortunately at ever shortening intervals. At first a year may elapse between the attacks, but finally they become almost continuous.

What then is the treatment for an attack of acute gout such as we have just described? It is possible to give the sufferer much relief,

and the one drug upon which we can depend is colchicum,

Treatment. The efficacy of this medicine was known to the Greeks and Arabians, and was extolled as a remedy for gout by Alexander of Tralles, a city of Lydia, in the sixth century. There is no doubt whatever that colchicum gives great relief in acute gout, but there have been certain arguments advanced against its use.

Some authorities say that it is followed by early and frequent relapses, and that the patient, although he gets rid of the attack, does not recover his general health so rapidly or completely, and continues below par for a much longer time. These objections may have some truth in them, but probably only when colchicum is used to the exclusion of other means, and without careful regulation of diet, and is left off on the first subsidence of local symptoms. It is not true, however, that the attacks return more quickly when the drug is properly administered. It may be taken in either of the following mixtures :—

PRESCRIPTION 9

Wine of colchicum $2\frac{1}{2}$ drachms.

Carbonate of potash $1\frac{1}{2}$ drachms.

Cinnamon water to 8 ounces.

An eighth part to be taken every 4 hours.

PRESCRIPTION 10

Tincture of colchicum $2\frac{1}{2}$ drachms.

Carbonate of lithia 24 grains.

Magnesia $\frac{1}{2}$ an ounce.

Tincture of orange $2\frac{1}{2}$ drachms.

Chloroform water to 8 ounces.

An eighth part to be taken every 4 to 6 hours.

These doses should be taken for a few days until the symptoms subside, but it is necessary to continue the medicine for some time after their entire cessation, the doses being gradually lessened, and the intervals between them lengthened. The second prescription contains magnesia, which counteracts acidity, dissolves uric acid, and acts as a mild purge.

It is most important to keep the bowels acting freely, and if the magnesia is not sufficient to do this it will be well to use Hunyadi or Apenta water, or five grains of the compound rhubarb pill. The diet, especially in strong persons, should be low, and consist of milk and milk foods, such as arrowroot, Benger's food, tapioca and sago, with small quantities of biscuits, toast and stale bread. Fluids should be taken freely, such as barley water, toast and water, or plain water. As the symptoms subside, beef tea, soups and eggs beaten up in milk may be added to the menu, ordinary foods, especially butcher's meat, only being resumed with great caution.

The local treatment consists in keeping the painful parts entirely at rest in as comfortable a position as possible, raised on a pillow, and wrapped up in cotton wool or flannel. The latter may be covered with oil-skin in order to encourage perspiration in the part. To relieve the pain, hot soda baths, or warm fomentations sprinkled with tincture of opium or tincture of belladonna, are useful, and the somewhat dirty application of equal parts of extract of belladonna and glycerine will be found very soothing, and can be applied under the fomentations. When the pain has gone, gentle friction with the hand or rubbing with belladonna and chloroform liniment will remove the stiffness and swelling, and finally, when all the symptoms have disappeared, exercise may be resumed in moderation, and with great care.

Chronic gout is the direct sequel to the acute disease, of which one attack after another has affected many joints and left them permanently stiff and tender. The hands are particularly liable to this condition, the knuckles become large, knobbed and deformed, with great stiffness and much interference with their movements. This condition is due to the formation of gouty concretions or "chalk stones" as they are called; the material is not really chalk but urate of soda, and is deposited from the blood in and around the joints at each succeeding attack of the disease. This substance produces the hard lumps and knobs, and by stretching the skin renders it liable to inflammation and injury. When this occurs the "chalk stones" are exposed, and come away as a sort of gritty material, mixed with discharge. Little collections of "chalk" are very liable to form in the margins of the ears, and go by the name of "tophi"; they are sometimes a great assistance in deciding whether a complaint is of a gouty nature, as they are found in persons who may never have

**Chronic
Gout.**

had an attack of true gout, and yet they are a sure sign of the gouty constitution. These various changes which occur about the joints in chronic gout are accompanied with a general deterioration of the health. The body becomes enfeebled, with poor circulation and flabby muscles. The digestion suffers, the liver gets sluggish and troublesome ; heartburn, flatulence, eructations, acidity, constipation, or diarrhœa are all likely to occur. The temper of gouty persons is proverbially irritable, and depression of spirits and fretfulness are common ; their sleep is restless and often disturbed by dreams and attacks of cramp, especially in the muscles of the calf.

There are very few organs of the body that may not be affected by gout, and it is these conditions to which the name of irregular gout is given. It is hardly possible to do more in this work than
Irregular Gout. enumerate the many and varied phenomena that come under this heading. Irregular gout often affects those who show but slight tendencies to the regular disease, and those whose joint symptoms are trivial. In some cases the regular and irregular symptoms alternate with one another ; as the joint symptoms improve the others grow worse. If an attack of acute gout is checked by exposure to cold or in other ways the internal symptoms become more serious and constitute then what is called *retrocedent gout*, whilst in those cases in which the local and regular symptoms are imperfectly developed and the internal symptoms become marked the complaint is called *suppressed gout*.

Many and varied are the forms which irregular gout takes. Acute attacks of cramp in the stomach, which is relieved by
Symptoms. pressure, and accompanied by a sense of great oppression ; violent fits of vomiting of bile ; palpitation and rapid and irregular pulse, with a feeling of discomfort over the heart, and suffocation ; a very slow pulse with faintness ; attacks of asthma or even bronchial catarrh, with free expectoration ; severe headaches ; neuritis, sciatica, and neuralgia ; muscular cramp ; eczema ; inflamed eyes and throat ; redness and itching of the nose ; stone in the kidneys and chronic Bright's disease of the kidneys, make up a formidable list of complaints produced by the gouty poison, and might well alarm any gouty person, but fortunately most of them are not very serious, and gout is rather painful than dangerous to life.

The treatment of chronic and irregular gout is to a great extent

preventive, and chiefly consists in avoiding the causes of the complaint. It is irksome, and requires in the patient determination and intelli-

Treatment. gence ; for so much depends upon his willingness constantly to regulate his mode of life according to principles suitable to his condition, daily to deny himself much that tempts his fancy, and to do many things that are opposed to his inclinations.

The most important matter in which self-denial must be exercised is in food and drink. Moderation must be the keynote of the rules regulating these. It is not necessary to starve, but it is necessary to be very temperate. The meals must be regular and eaten slowly. The proper diet for a gouty person is a much discussed subject, and one upon which great difference of opinion exists, probably owing to the fact that gouty persons vary so much in constitution, and that their digestions vary at different times in activity and power. At one time a food may be suitable for a gouty person which at another time may be injurious, and a diet suitable for a stout, robust individual would be harmful to a thin, delicate person. In health the food is digested and burnt up in the body, and the waste material produced is carried off through the kidneys. The chief of these waste materials is urea ; it is easily soluble in water, and passes through the kidneys with very little trouble, but in those who have the gouty constitution the change of the food into waste material is carried out imperfectly, especially if the food is taken in any excess, and instead of urea being formed, uric acid is produced. This is far less soluble, and is not carried off by the kidneys, but collects in the body, especially in the spleen and joints. If anything produces an increase in the naturally alkaline condition of the blood this uric acid is set free and causes the gouty symptoms of headache and depression of spirits. The uric acid is also liable to combine with soda and produce attacks of true gout, by the deposition of crystals of urate of soda or "chalk stones" in the joints and other parts of the body.

Our first indication, then, in dieting a gouty person is to make the diet just sufficient for his needs, and for his organs to dispose of completely. The diet must, therefore, be curtailed in almost every particular ; the individual, to keep his enemy at bay, must learn to be abstemious ; he must limit the amount of animal and of sweet and starchy foods, and even fatty articles must be taken with circumspection ; he must get up from his meals with the feeling that he could eat a little more

with pleasure, must consume just enough food to maintain his weight and strength and repair the natural waste that is going on in his body. He should take regular exercise to keep his organs in healthy condition, a daily ride or a walk of from three to four miles a day ; he should have regular warm or tepid baths, with occasional massage or Turkish baths to keep his skin at work, should wear warm clothing, and avoid fatigue.

The exact amount of food cannot be stated in ounces and pounds, as it varies with the individual and the condition of his digestive and excretory organs, and more than anything else with the mode of life he lives. Sedentary habits admit of less indulgence than an active out of door life, and it is necessary for each gouty person to ascertain by experience and careful observation how much food he requires, how much he can dispose of without trouble, what particular articles are most likely to disagree with him and cause unpleasant symptoms. A stout, gouty person should take meat and little vegetable and fatty foods, whilst the thin should make the two latter his chief diet and lessen his meat considerably.

As, however, the animal foods produce the chief part of the urea in the excretions they should receive first attention. We do not recommend a totally vegetarian diet, but butcher's meat should be taken sparingly, once a day, and for choice at the midday meal. Mutton is the best meat, beef next ; but pork, veal, dry or salted meats, re-cooked foods, sauces, rich gravies, and made dishes should be avoided like poison. Fish is an excellent food, but the fatty and indigestible varieties—mullet, mackerel, salmon, herring, eel, lobster, crab, and oysters—are not advisable. Eggs are good when lightly boiled or poached, and chicken, game, and butter are allowed.

Foods containing starch and sugar should be taken with moderation. Sugar is often found to disagree, as it produces acidity and dyspepsia, and its place should be taken by saccharin. Pastry, jellies, and sweets generally are bad, and so are very sweet fruits ; strawberries, grapes and oranges may be used in small quantities, pears and apples, if cooked, and lemon juice is recommended.

Stale bread, toast, rusks, biscuits, potatoes, and other vegetables are permitted, but the vegetables must be thoroughly cooked. Salads, celery, and green vegetables are most advisable, whilst asparagus, haricot beans, broad beans, peas and lentils may be taken in small quantities.

Of the various drinks, ale, porter, stout, port wine, champagne, Burgundy, sherry and Madeira, and all liqueurs, should never be touched, except under medical orders, whisky and brandy only if necessary, and never in greater quantity than four or six tablespoonfuls a day, and they should be freely diluted with potash or lithia water ; unsweetened gin, claret, hock, and other light dry wines and rough cider (not bottled) are allowed.

Milk, lime juice, and lemon juice, well diluted, tea freshly prepared and not strong, coffee, cocoa made from the nibs, are all permitted, and water may be drunk as freely as desired. A gouty patient should take from two to four pints daily, as it washes out the waste material from the body, and stimulates the action of the excretory organs.

The Haig diet for those goutily inclined is founded on the principle that all foods which contain uric acid must be eliminated from the dietary, and that only uric acid-free foods shall be taken. The foods forbidden include animal flesh of all kinds, meat, fish, fowl, game and eggs, and of vegetable substances, the pulses—peas, beans, lentils—asparagus and mushrooms. Amongst beverages, tea, coffee, chocolate and cocoa are considered injurious. The foods allowed are breadstuffs—bread, biscuits, and puddings—cereals, and starchy foods, as rice, macaroni, etc. ; garden vegetables, and fruits, with milk and cheese.

Exercise is excellent for gouty people—golf, walking, riding, bicycling, and indeed any form which produces perspiration, but it should not be carried far enough to cause exhaustion. Follow the maxim “Early to bed and early to rise,” and avoid excessive mental labour. Dress warmly, be careful of damp and cold, live in a warm and equable climate if possible, especially in the winter ; and avoid crowded and badly ventilated rooms. Lastly, once every year or every two years visit some health resort and take the waters. Particulars of health resorts will be found elsewhere.

Medicinal treatment is of great value. Colchicum is useful, though its effects are not so rapid as in acute gout. Either of the following pills is to be recommended :—

PRESCRIPTION II

Extract of colchicum	.	.	.	2 grains.
Sulphate of quinine	.	.	.	8 grains.

Make 8 pills. One to be taken 3 times a day, after meals.

PRESCRIPTION 12

Colchicine	.	.	.	.	.	$\frac{2}{5}$ grain.
Extract of nux vomica	.	.	.	.	.	3 grains.
Extract of gentian	.	.	.	.	.	12 grains.

Make 12 pills. One to be taken 3 times a day, after meals.

Or the following mixture, if the patient dislikes pills :—

PRESCRIPTION 13

Iodide of potash	.	.	.	.	.	24 grains.
Colchicum wine	.	.	.	.	.	80 drops.
Bicarbonate of potash	.	.	.	.	.	$2\frac{1}{2}$ drachms.
Carbonate of lithia	.	.	.	.	.	24 grains.
Chloroform water to 8 ounces.						

An eighth part to be taken 3 times a day.

Guaiacum resin is a valuable drug, as it aids in the removal of uric acid from the body. It can be obtained in capsules containing 5 grains each, and two of these should be taken two or three times a day. It forms one of the ingredients of "Chelsea Pensioner," which is so named from its frequent use by the old soldiers of the Royal Hospital at Chelsea for chronic gouty affections. This preparation is found to be efficacious, but hardly agreeable. The dose is one to two teaspoonfuls. It is made up somewhat as follows :—

PRESCRIPTION 14

Guaiacum in powder	.	.	.	.	.	6 grains.
Sublimed sulphur	.	.	.	.	.	9 grains.
Carbonate of magnesia	.	.	.	.	.	6 grains.
Ginger	.	.	.	.	.	3 grains.

Treacle, 36 grains in each teaspoonful.

and to these is often added—

Acid tartrate of potash	20 grains.
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It should be taken 2 or 3 times a day.

A remedy which seems to be getting popular in England for all chronic gouty conditions is that which has received the slang name of "nun powders." These are the "anti-gouty" powders prepared by the Benedictine mothers of Pistoia, in Italy. They are said to contain "no colchicum, belladonna, nor any other poisonous substance," but "are a composition of medicinal grasses," or "Indian and gentian woods." Whatever may be their composition, they appear to have been very beneficial in some cases. One powder is taken daily two hours before breakfast, in half a glass of cold water or tepid coffee, and very

little alteration is required in the diet. The treatment must be continued for a year, and during the following year for one month, every change of season.

Constipation in gouty persons must receive special attention, and may be overcome by occasional doses of blue pill, or by adding 10 grains of salicylate of soda to each dose of the mixture set out in Prescription 13.

For local treatment, in order to remove stiffness and pain, we may employ liniment of iodine ; blisters ; friction with compound camphor liniment ; long-continued warm compresses ; the application of great heat, as in the Dowsing and Tallerman treatment, described elsewhere, or hot-air and hot-water baths, which can be had at Bath and Buxton.

CANCER

Cancer (Latin, a crab) is a disease which may affect all parts of the body. It is sometimes taken in popular language to mean the same as "tumour," but this is quite a mistake, for the word tumour simply means a lump or swelling, which may be cancerous or not, as the case may be.

Tumours are divided into two great classes (1) benign, simple, or innocent, and (2) malignant or cancerous, and the two classes are distinguished from one another by many important characteristics.

The benign tumours are formed of structures which are already present in the body, such as fat, bone, or fibrous tissue, but malignant tumours are in their structure quite unlike the ordinary tissues of the body ; benign tumours remain localised, whilst malignant tumours affect the body as a whole, and produce general ill-health ; benign tumours, if removed, do not return, but malignant ones have a great tendency to grow again ; and lastly, malignant growths are liable to disseminate and start fresh growths in other parts of the body, such as the lymphatic glands and internal organs.

The term cancer used to be applied to all malignant tumours, but as the result of increased knowledge, especially that supplied by the use of the microscope, malignant tumours are now divided into two groups, the carcinomata and the sarcomata (or fleshy tumours), and it is to the former only that the name is now technically applied.

Cancer, therefore, is a *malignant* tumour, and may appear in almost every organ and part of the body—the stomach, the womb, and the

female breast being the organs most frequently affected. Because of the special liability of the two last-named organs to be involved, cancer is met with more often in women than in men. Persons of all ages may fall victims to the disease, but the large majority of cases are in middle-aged or old people, the young being comparatively free. Many mammals, birds, and fishes are known to suffer in common with mankind.

It is natural that we should desire to know what conditions predispose to the complaint, and our first thought is directed to the question of inheritance. There are those who believe that cancer runs

Cause. in families, and that the tendency may be inherited; but it is admitted that the tendency is not sufficiently strong to cause any serious alarm, for the majority of those who suffer from cancer have no such predisposition. It used to be thought that those who inherited the cancerous taint were born with the disease in a latent state in their bodies, and that when they reached adult life it became active and produced a tumour, but this theory has been quite rejected as untenable. The inheritance is now looked upon, by those who believe in this theory, as only a predisposition or tendency to the disease, due to a lack of resisting power in the tissues of the body. There also appears to be a curious tendency for the disease to affect certain houses and localities, and in what have been called "cancer houses" one individual after another has been attacked by the disease. It sometimes occurs in parts of the body which have been injured and, more commonly still, where there has been a long-continued irritation. A blow on the breast, for instance, has been known to be the determining cause of a cancer in that organ, and soreness of the tongue, due to a rough clay pipe or a broken tooth, of a cancer of the tongue. Injuries and chronic irritation may therefore be looked upon as occasional predisposing causes.

The actual cause of cancer is still unknown, but the interest in the question is now so intense and widespread, and so great a body of skilled scientific observers are at work with the special object of unravelling the mystery, that we may hope that the time is not far distant when we shall know the truth. Opinion is much divided between two theories—that the disease is due to a germ, and that it is simply a strange departure in the growth and development of the individual cells of the body. The similarity between the behaviour of cancer and those diseases known to be produced by germs leads many to pin their faith to the former hypothesis. Indeed, a definite germ has been discovered by many investigators, to

which the name of *Micrococcus neoformans* has been given. This germ has been isolated, and cultures have been made of it, and a disease similar to cancer has been produced by inoculating it into animals ; but even this is not convincing, for other observers have failed to get the same results from the experiments. They found the germ and cultivated it, but were unable to produce cancer by injecting it into animals. The fact remains that cancer can be produced in mice by grafting into them portions of a cancer from another animal, or by inoculating them with cancer-juice ; but this, of course, is a very different thing from producing the disease by inoculation with the germs.

The symptoms of cancer are very variable, and depend much upon the part affected. A swelling is always present, and can be felt when

Symptoms. it affects an external organ or superficial part, but if it involves an internal organ the swelling may remain unrecognised until a late stage of the disease, and the early symptoms then consist of some disturbance of the functions of the organ, pain, and a general deterioration of the health.

Cancer is popularly believed to be one of the most painful of affections, and it is quite true that in the majority of cases much pain of a darting or stinging character is experienced, but this is not always so, for many cancerous tumours develop without any pain at all, and it is therefore not possible to comfort oneself with the belief that a tumour which is not painful cannot be cancer.

The disease is localised when it first begins, but gradually undermines the general health ; the appetite fails, the body wastes and the strength diminishes, and the patient shows the debilitating effects of the affection by his wasted, sallow, unhealthy appearance.

The duration of cancer is quite indefinite, and may vary from a few months to many years, according to the organ affected, the age of the patient and the malignancy of the disease. When important organs are involved whose duties are necessary to the maintenance of life, such as the stomach, the end comes quickly ; but in cancer of external parts, as the skin or female breast, it may be much prolonged. In old persons the disease makes much slower progress than in the young. Lastly, in those forms of the complaint in which the growth is soft, and is supplied with a large amount of blood, the symptoms rapidly develop and assume a particularly malignant type.

Cancer always tends to increase, and as it does so it softens, ulcerates,

produces an offensive discharge, and spreads to other parts, forming secondary growths. The first structures to which it spreads are the lymphatic glands in the neighbourhood of the original growth, but later on all parts of the body may be invaded, those most commonly affected being the liver and lungs.

It is of the utmost importance to recognise the presence of cancer at as early a stage as possible, and yet the difficulty of doing so is very great even for a professional man, and almost impossible for the unskilled. It is well, however, that we should be acquainted with the symptoms which should arouse our suspicions. A tumour which occurs in a person past middle age and whose health is failing, which can be traced to no definite cause such as inflammatory disease or injury, nor is due to a constitutional taint such as syphilis or scrofula ; which is accompanied with darting pains ; which gradually grows larger and produces an obstinate and slowly increasing ulceration ; which affects the neighbouring lymphatic glands, and is complicated with evidences of disease of internal organs, is very likely to be cancerous ; but we must clearly understand that in spite of the existence of many of these evidences it may still be some simple growth. No one should be foolish enough to watch a tumour grow until these various symptoms develop, for many of them only arise after all hope of successful treatment is long passed. It is far better to consult a doctor early about a growth, however unimportant it may seem, than continue to watch one grow worse with inward dread, fearing to know the truth.

As we have said, the natural tendency of cancer is to grow, and finally to destroy life, but there are a few exceptions to this rule, and every medical man of long experience can remember rare cases of what seemed to be undoubted cancer gradually disappearing spontaneously, and a similar condition has been met with in mice that have been experimentally infected with cancer, for every now and then these animals obtain power to triumph over the disease, and finally become entirely free from it. This spontaneous cure is so rare that it cannot be taken into consideration in treating any particular case, but the knowledge that it may possibly happen raises our hopes for the future, when perhaps we may discover what it is that has enabled the affected individual to vanquish the dread disease.

The treatment of cancer is making great advances, and is occupying the minds of scientists in many countries. Several Funds have been

started to support research work on this subject, and the Imperial Cancer Research Fund in this country has supplied the means by

Treatment. which many careful and scientific observers are making

experiments to discover the cause and cure of the malady. Much information has thus been obtained, and really good work is being done which will bear fruit in the future, but the time is not yet. We occupy a position from which we can almost see the much-longed-for discovery, but until it is made we must possess our souls in patience, and the sufferer from malignant disease must still be content to place himself in the hands of the surgeon for treatment. We must not expect any surgeon, however, to promise "a cure"; he can but remove the disease as thoroughly and completely as possible. In many cases a cure is obtained, and the disease never returns, but in others there is a recurrence, and the patient dies. In this the "cancer curer" differs from the professional man. The former calls almost every tumour a cancer, and promises a certain cure in every case; the latter distinguishes carefully between cancer and the benign tumours, and only promises to do his best to cure the cancer.

Operation, then, is still the proper treatment for cancer, and the only one that should be trusted to, and this should be carried out as early as possible, whilst the disease remains only a local trouble and is capable of complete removal. It cannot be insisted upon too strongly that the patient who broods in secret over a cancer and purposely avoids obtaining professional advice is simply throwing away the chances of relief that operation provides, for the disease constantly advances and spreads, until it reaches a stage when all hope of cure is lost even after the most extensive operation.

The Cancer Research Associations are most carefully examining and experimenting with every form of reported cure, and have so far found them useless. Violet leaves applied as a compress to a cancer have been reported to bring about a cure. The active principles of these leaves consist of two crystalline bodies forming about 2 per cent. of the leaves with a small quantity of dark green oil, but the results of these on cancer in the hands of many skilled observers have been negative, no benefit whatever being obtained. Trypsin and amylopsin are two substances produced by the pancreas or sweetbread which have been found capable of checking the growth of cancer by some observers; they are, however, still in the sphere of experiment only. More hopeful is the effect of radium

and X-rays on the disease, for there is reason to believe that superficial cancers, if treated early, can be cured by these means, but at present it is found impossible to bring these remedies to bear upon deep-seated cancer affecting internal organs. Unfortunately, these methods of treatment are very expensive, and are no more successful than operation, except for small cancerous growths on the face.

Another method of treatment has for some time been employed which consists of the injection under the skin of fluids—serum and vaccines—produced in various ways with the *Micrococcus neoformans* or supposed cancer-germ, much in the same way as Tuberculin is produced by the tubercle bacillus. We cannot but feel that this treatment is in accord with the scientific knowledge of the present day, but the experience of observers in this country has not been so far favourable, some reporting that “alarming symptoms and severe pain have been produced by the injections, that all the cases went steadily downhill, and in none was there any improvement,” whilst others report that there was shrinkage of the cancer and relief of pain. This is not particularly encouraging, but the least glimmer of hope is to be welcomed where all is dark. Our final advice is that anyone who has a suspicious tumour should at once consult a skilled surgeon as to its nature, and if he declares it to be cancer should have it removed at once by operation, for as Shakespeare says—

“Diseases, desperate grown,
By desperate appliance are relieved,
Or not at all.”

But we firmly believe that the time is not far distant when we shall be able to replace the “desperate appliance” with milder measures, and the knife will give place to the hypodermic needle or to drugs. In the meantime let not the sufferer from cancer try “cancer cures,” with the hope of obtaining relief, for once the discovery is made it will be impossible for it to remain a secret; it will be as the lightning under heaven.

TUBERCULOSIS

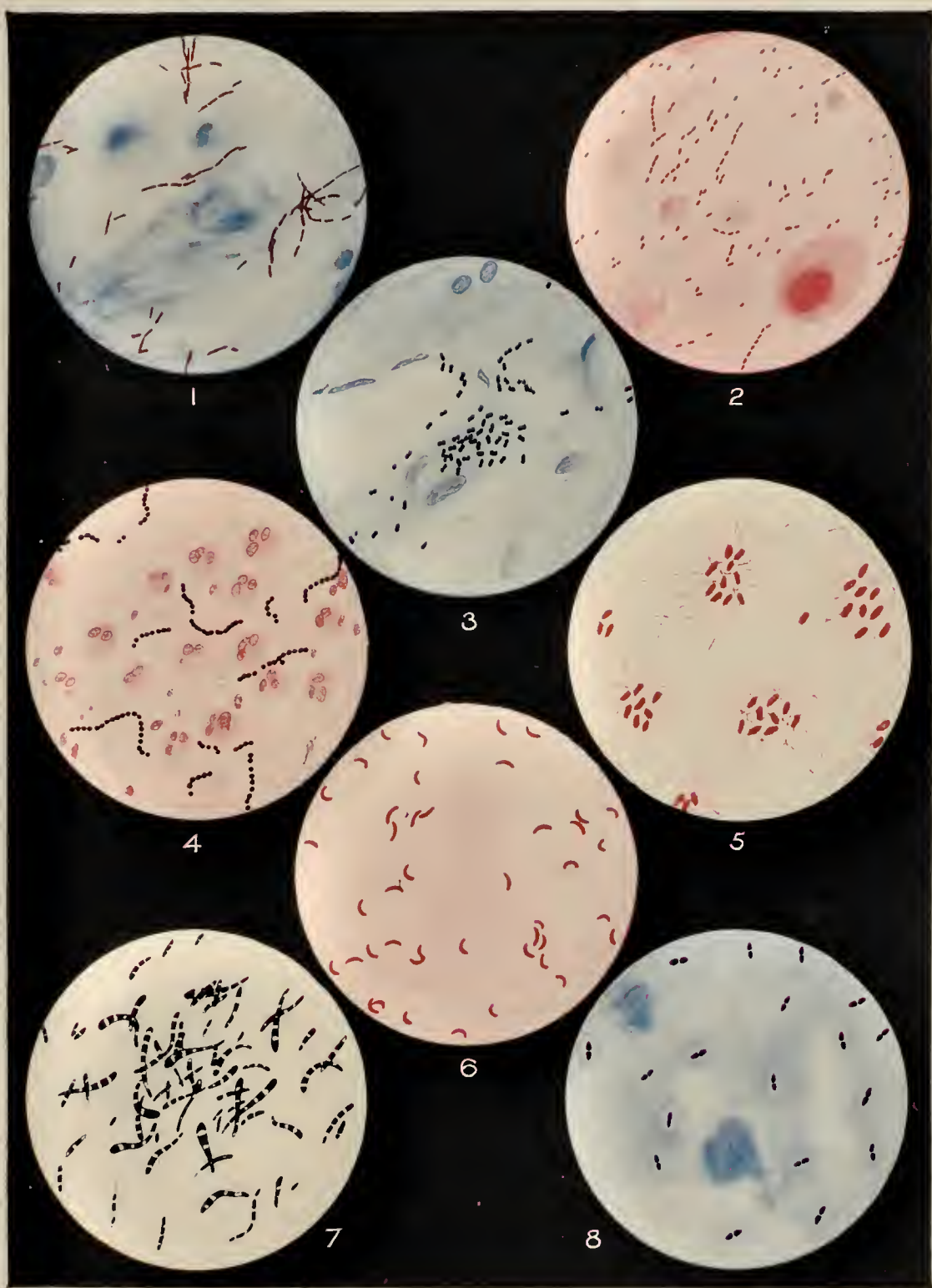
The disease caused by the tubercle bacillus may affect not merely the lungs, but many other parts of the body. It is one of the infective diseases, being produced by its special bacillus, and in no other way. The important discovery of this bacillus, the existence of which had long been suspected, was made in 1881 by Dr. Koch,

who proved that it was present in all varieties of tuberculous disease, that it could be cultivated artificially, and that when it was introduced into the bodies of the lower animals it produced tubercular disease in them, and his experiments, supported by those of many subsequent observers, demonstrate that it is the one and only cause of all tubercular disease. This bacillus is a minute rod-shaped vegetable organism about $\frac{1}{7000}$ inch in length, and about one-sixth of this in breadth, which grows slowly, and has been found in most of the tissues and fluids of the body, but is decidedly particular as to its food supply and surroundings, and flourishes best at about the temperature of the body. It is killed by the temperature of boiling water, and by many chemical substances.

Having learnt these facts about tuberculosis and its cause, it is not difficult to understand that it is a contagious disease, that the contagion is the microbe, and that it is transmitted from the infected individual to others in many different ways. The microbe may enter the body by the breathing organs, being drawn in with the breath, and the most common source of the infection is then the dried expectoration of a consumptive person which has been wafted about by the air. Secondly, it may enter the body by the digestive organs, being either self infected by a consumptive person swallowing microbe-containing expectoration, or taken in foods by eating the flesh of tuberculous animals which has been insufficiently cooked, or drunk in the milk of cows whose udders are affected with tuberculous disease, without precautionary measures having been taken to sterilise the fluid. Thirdly, infection has been known to gain admission to the body by wounds.

Tuberculosis may occur as a general infection, many parts of the body being involved simultaneously, or as a local trouble, being confined to some special organ or tissue.

General tuberculosis is commonly met with in children who have been debilitated by severe illness (one of the most common of such illnesses being measles) or by starvation. Its symptoms are severe, and include high fever, rapid wasting, and grave prostration; they are very similar to, and have often been mistaken for, enteric fever, and they end fatally in the course of a few weeks. Combined with these general symptoms are those due to the special organs affected, such as the lungs, brain, or bowels.



BACTERIA OF COMMON DISEASES

- 1, BACILLUS OF CONSUMPTION. 2, BACILLUS OF INFLUENZA. 3, MICROCOCCUS OF RHEUMATISM.
 4, STREPTOCOCCUS OF ERYSIPELAS. 5, BACILLUS OF TYPHOID. 6, BACILLUS OF CHOLERA.
 7, BACILLUS OF DIPHTHERIA. 8, DIPLOCOCCUS OF PNEUMONIA

Tuberculosis occurring as a local disease most frequently affects the lungs, and then receives the name of *consumption of the lungs*, or phthisis (a wasting), which is described elsewhere. The **Local Tuberculosis.** *lymphatic glands* are also frequently affected by tubercular disease, and then they form the lumps which appear in chains up the sides of the neck. The lumps are enlarged glands, and if neglected will soften into cold abscesses and burst, leaving discharging wounds which heal very slowly, and when healed produce the disfiguring puckered scars so often seen. Before the discovery of the tubercle bacillus this affection was called scrofula or struma, and was considered to be a perfectly distinct disease from consumption; but now that we recognise that it is due to the same microbe, the terms scrofulous and strumous, as applied to these glands, have become quite unnecessary.

If the tubercle bacillus be swallowed in meat, milk, dust or expectoration, the *digestive organs* are liable to become infected. The gullet and stomach are fairly exempt, the latter probably being protected by the presence of gastric juice, but this fluid does not destroy the bacilli, for they pass on, and not unfrequently affect the intestines, producing the disease called *consumption of the bowels*. This term is applied vaguely to many affections accompanied by severe diarrhœa and wasting which are not of a tuberculous origin; but it should be limited to those cases in which these symptoms are produced by ulcerations of the bowel caused by the formation of tubercles. The peritoneum occasionally becomes studded all over with little swellings formed by tubercles, and acute inflammation is set up. This *tubercular peritonitis* has similar symptoms to ordinary peritonitis, but is much more fatal, indeed very few cases are known to recover. The lining membranes of the brain, the meninges, are also occasionally the seat of tubercles, which set up inflammation and produce the disease called *tubercular meningitis*, which is a far more fatal condition than the simple form of inflammation of these membranes.

We need here but mention the most common manifestations of tubercular disease, as each will receive attention in its appropriate place. Many joint affections, especially of the hip and knee, are due to this cause. The bones may be affected, and one of the commonest forms of hump back or angular curvature of the spine is due to tubercle of the bones of the vertebræ. Lupus (Latin, a wolf) is a most inveterate skin

disease produced by the tubercle bacillus, and Addison's disease is the result of destruction of the suprarenal capsules—the capsules at the top of the kidney—by the same microbe.

ANÆMIA

The term anæmia, which literally means "bloodlessness," is applied to many different conditions in all of which poorness of blood is a marked symptom. We will here describe first the special disease called "anæmia," or chlorosis, and secondly the various forms of bloodlessness produced by very varied causes.

Anæmia occurs almost always in young single women, although exceptional cases of a very similar condition are met with in children, married women, and even men. It is closely connected with the critical period of life in young women, and is usually believed to be more common in the higher ranks of life. In many cases there seems to be a distinct hereditary tendency to the complaint, while the exciting causes are definitely connected with unhealthy conditions of life. An insufficient supply of sunlight causes anæmia, as it causes a similar condition in vegetables, which become "blanched" by being kept in darkness, and the effects are particularly evident amongst the dwellers in large towns. An unsatisfactory diet in which the food is either of insufficient quantity or of unsuitable quality; bad hygienic conditions such as working and living in close, ill-ventilated rooms, and the want of healthy exercise and fresh air, will all act injuriously by interfering with the healthy formation of fresh blood.

The appearance of an anæmic girl is most striking. The face is white, and in some cases almost green, the latter appearance giving rise to the popular name of "green sickness" (hence *Symptoms.* *chlorosis*, meaning green or sallow). The pallor is very characteristic, and is quite distinct from the bilious yellow colour of jaundice. It may be obscured by accidental circumstances, such as sun-burn or scorching by the heat of a fire, but it at once becomes apparent if the skin of the neck, or some other part protected from exposure, is examined. It is also readily seen by looking at the nails or the mucous membrane of the lips, gums, or lower eyelid.

Debility and weakness are often extreme, the patient feels languid, heavy, and disinclined to make the slightest exertion, and gets tired at once if she does so. She is troubled with frequent sighing and yawning,

is sleepy, dull and low spirited. She suffers much from headache, especially felt in the temples and at the top of the head ; the pain is of a dull heavy character, is increased by hunger, fatigue or movement, and relieved by lying down and by taking food. Humming noises in the ears, spots and shadows floating before the eyes, neuralgic pains, muscular soreness, back-ache, and side-ache are common troubles. The least emotion or exertion increases the rate of the pulse, and sets up breathlessness and palpitation of the heart ; the mere receiving a visitor will make the patient pant as if out of breath, and start the palpitation of the heart. There is, however, no disease of either heart or lungs in spite of these, and many other symptoms which are common, such as pain in the heart region, fainting fits, coldness of the extremities, and swelling of the feet, hands and eyelids, these symptoms being directly due to the poverty of the blood and its inability to keep the heart and other organs properly nourished.

Anæmic persons have very capricious appetites : some can eat well, others have absolute loss of all desire for food, whilst yet others have all sorts of queer whims and fancies, and will eat mud and filth. Indigestion is a frequent complication of anæmia. Constipation also is a common condition ; it is sometimes most obstinate, and does harm by causing indigestion, loss of appetite, and general ill-health. Another serious complication of severe anæmia is the development of gastric ulcer, the formation of which may be the cause of dyspeptic symptoms.

The condition may continue for months, and gradually grow worse, unless checked by suitable treatment. In spite of the great debility it produces and the general interference with the enjoyment of life it entails, an ordinary attack of uncomplicated anæmia seldom ends fatally ; but we must be careful in treating a case to be sure that the "bloodlessness" is not due to some of the more serious diseases which we shall mention later.

The treatment of anæmia is almost always successful, and the patient generally recovers her health entirely in the course of a very few weeks. She is, however, very liable to have a relapse,

Treatment.

and suffer from all the symptoms over again, if the treatment is discontinued too soon. It is important to obviate as far as possible all sources of ill-health, and to secure for the patient salutary conditions of life. Much benefit is often obtained by change of air to a healthy and bracing seaside or country place, where she can spend

a large portion of her time in the open air, and can take a fair amount of exercise. She must have innocent amusement, keep early hours, have plenty of sleep and a nutritious wholesome diet. The diet must include a moderate proportion of animal food, and exclude all rich, highly flavoured and indigestible articles, and especial value is attached by some to a small quantity of stout daily. Sea bathing often assists convalescence.

Of more importance than any of these measures is the administration of medicines, and the one drug which is essential in all cases and can almost be looked upon as a specific for anæmia is iron. Few cases get well without iron, and all uncomplicated cases recover under its use. This metal forms an essential part of the red corpuscles of the blood, as much as six and a half per cent. being contained in the red colouring matter. As it is the red blood cells which in anæmia are deficient, it can easily be understood how important a part iron plays in the cure. Unfortunately there are some very definite objections to iron as a medicine, for many of the preparations cause both indigestion and constipation, and thus tend to increase two of the common symptoms of anæmia. Amongst minor objections is the blackening of the tongue and teeth. Only a very small proportion of the iron taken is absorbed into the blood, the remainder being carried off in the motions, to which it imparts a black colour.

To counteract the constipating effect we have to choose those preparations which are least astringent, or to add some laxative drug to the mixture, and those most useful for this purpose are sulphate of magnesia and cascara. It is well in many cases to give an aperient every night, and we can recommend an aloes and myrrh pill, or a cascara tabloid.

In those cases where indigestion symptoms, such as nausea, vomiting and pain after food, are present it is often necessary to relieve these first before starting the iron. This may be effected by careful dieting, and the administration for a few days of some such mixture as the following :—

PRESCRIPTION 15

Carbonate of bismuth	.	.	.	80 grains.
Tincture of nux vomica	.	.	.	80 drops.
Bicarbonate of soda	.	.	.	2 drachms.
Mucilage of gum	.	.	.	$\frac{1}{2}$ ounce.
Tincture of orange	.	.	.	2 drachms.
Chloroform water to 8 ounces.				

An eighth part to be taken 3 times a day, 20 minutes before meals.

A very favourite form in which iron is administered is the carbonate of iron or Blaud's pills. These should be taken after meals two or three times a day, and the dose gradually increased to three pills three times a day. It is of great importance that they should be freshly made, for the iron in them is liable to become oxidised, and is then considered to have lost much of its efficacy. Blaud's pill can be obtained in the form of capsules, tabloids or bipalatinoids; in all of them there is a mixture of drugs which combine and form carbonate of iron, but only after the dose has been swallowed. Reduced iron is very popular with some doctors, and is not constipating; it is a greyish-black powder, and two to six grains should be taken three times a day, immediately after or even during a meal, in the form of a powder, pill or lozenge.

Sulphate of iron pills can also be recommended, from one to five grains being taken three times a day. If for any reason the pills, capsules or powders do not suit the patient, iron may be taken in a mixture, and we will give a few useful prescriptions:—

PRESCRIPTION 16

Tartrate of iron	80 grains.
Bicarbonate of soda	2 drachms.
Spirits of chloroform	2 drachms.
Infusion of calumba to 8 ounces.	

PRESCRIPTION 17

Citrate of iron and ammonia	80 grains.
Carbonate of ammonia	24 grains.
Spirits of chloroform	2 drachms.
Water to 8 ounces.	

An eighth part to be taken 3 times a day after food.

Either of these two mixtures can be taken even when dyspeptic symptoms exist, and when the stronger and more astringent preparations are unsuitable.

The two following mixtures contain the stronger tincture of perchloride of iron or tincture of steel, and either of them is especially useful if hæmorrhage or other discharges are present.

PRESCRIPTION 18

Tincture of perchloride of iron	80 drops.
Tincture of nux vomica	1 drachm.
Dilute phosphoric acid	40 drops.
Spirit of chloroform	1½ drachms.
Water to 8 ounces.	

An eighth part to be taken 3 times a day after meals.

PRESCRIPTION 19

Tincture of perchloride of iron . . . 2 drachms.
 Spirits of chloroform . . . 2 drachms.
 Glycerine . . . 1½ drachms.
 Infusion of quassia to 8 ounces.

An eighth part to be taken 3 times a day after meals.

A mixture containing a very easily digested form of iron combined with strychnia, a bitter tonic, is the following :—

PRESCRIPTION 20

Syrup of the phosphate of iron . . . 1 ounce.
 Solution of strychnia . . . 24 drops.
 Chloroform water to 8 ounces.

An eighth part to be taken 3 times a day, ½ an hour before food.

Easton's syrup also contains iron and strychnia, and a dose of half a drachm to a drachm may be taken in half a wineglassful of water three times a day, before meals ; pills, tablets, and capsules can be obtained of the same composition, but without the syrup.

Mineral waters containing iron undoubtedly do good in anæmia, especially when taken at the actual springs. Probably the change of scene and the altered conditions of life have something to do with the improvement, for the quantity of mineral in any of these waters is small. Ferruginous or chalybeate waters are to be found at a large number of places, such as Tunbridge Wells, Harrogate, Spa, and Schwalbach. Levico water, which contains arsenic as well as iron, is a valuable medicine, and should be taken in teaspoonful doses, in wine, milk, or water, three times a day after meals.

Anæmia may occur as a symptom of many other diseases, and then it differs in several respects from the distinct disease already described.

It then affects persons of all ages and of both sexes.
Symptomatic Anæmia. Many severe diseases which gradually undermine the health produce extreme anæmia, such as cancer, consumption and Bright's disease, and almost any condition which causes general debility and ill-health may be accompanied with this symptom. Nothing, however, is more certainly followed by anæmia than loss of blood, whether it arises spontaneously or as the result of accident. The rapid loss of large quantities of blood, whether it comes from a wound, is vomited from the stomach, or is spat up from the lungs, causes intense pallor, and it can easily be understood that anæmia

thus produced in the course of a few minutes may take many weeks, or even months, to cure. But long-continued losses of small quantities of blood, which may in themselves appear quite insignificant, will also in course of time lead to severe anæmia, from whatever source the blood may be derived; bleeding from the nose, spitting of blood, bleeding from piles, or great frequency or excess of the monthly periods, are all common causes of this condition. Again, although there may be no actual hæmorrhage, there may be a drain of the fluid of the blood from the body, and the result is the same. In this way long-continued discharges from any part, the loss of albumen from disease of the kidneys, or too prolonged suckling of an infant, may lead to extreme debility and anæmia.

The condition is also produced in the course of slow poisoning by many metals, as for example lead, mercury, arsenic, and copper. Certain causes act by disturbing the functions of the blood-making organs, namely the spleen, the bone marrow, and the lymphatic glands. The spleen is very commonly affected in ague, and is often much enlarged, and some of the severest forms of anæmia are met with as a sequel to this disease. The bone marrow is found to be much affected in a form of bloodlessness which is called *progressive pernicious anæmia*. It is supposed to be due to a poison which enters the body by the digestive organs, and whilst causing great anæmia, also interferes with the formation of new blood by affecting the bone marrow. It is a very fatal disease, and by some considered incurable. Iron has none of the beneficial effects that it exerts in ordinary anæmia, but by arsenic, bone marrow and other remedies some cases have been cured.

Another disease in which anæmia occurs in a severe form, and in which the lymphatic glands in many parts of the body are much enlarged, is known as *Hodgkin's disease* or *lymphadenoma*. Lastly, there is a disease called *leukæmia*, in which the white cells of the blood are enormously increased in number, whilst the red cells are reduced.

The treatment of anæmia secondary to other diseases resolves itself into the treatment and, if possible, the removal of its cause. Iron cannot be looked upon as a specific as it is in chlorosis. In most cases arsenic is found useful, but this drug should only be
Treatment. taken under medical advice, and in many diseases we have mentioned the outlook is so serious that death will result even when the treatment is in the hands of the most experienced medical man.

HÆMOPHILIA

In those who suffer from this disease (called "bleeders") a slight bruise may cause free hæmorrhage under the skin; the extraction of a tooth or any trifling injury may cause profuse or even fatal hæmorrhage. The disease is almost entirely limited to the male members of a family, although both males and females may transmit the disease to their children, even without being themselves affected by it. The cause is not known with certainty, but is supposed to be due to a peculiar condition of the blood in which there is a greatly diminished tendency to the formation of clot. No cure for it is known. It is important to be prepared for severe hæmorrhage after the slightest wound, and to check bleeding if it occur without delay by carefully applied pressure.

EXOPHTHALMIC GOITRE

Also called "Graves's disease," after the physician who first described it, is an affection of the thyroid gland, which is situated in the neck (Fig. 1). The secretion which this gland pours into the blood becomes abnormal in character, and produces a peculiar train of symptoms by its poisonous action on the body.

The most prominent symptoms are an enlargement of the thyroid gland, a prominence of the eyeballs, rapid pulse, palpitation of the heart, and a condition of extreme nervous irritability.

Symptoms. It is from the two first-mentioned symptoms that the disease derives its name of exophthalmic goitre. The swelling of the throat is usually more marked on one side than the other, and forms one of the varieties of goitre; but it is soft, and throbs with each beat of the heart, whilst the ordinary form is firm and solid.

The symptoms are all made worse by emotional excitement, and usually have monthly exacerbations in women. One of the earliest symptoms, which continues throughout the illness, is a marked deterioration of the patient's temper; a previously pleasant person becomes irritable and depressed. It is soon followed by palpitation of the heart, with flushing of the face and a sense of fulness in the head, eyes and throat. Excitement and exertion increase the palpitation, cause the pulse to become rapid, and even irregular, and produce breathlessness and a sensation of suffocation.

Young women from twenty to thirty years of age, of nervous disposition, are the most common subjects of this complaint, and it is

comparatively rare among men. The course of the trouble is usually prolonged, and extends over many months, or over years.

Treatment consists in living a quiet, healthy life, taking simple, nourishing food, and carefully avoiding all bodily fatigue and mental excitement or worry. Rest in the recumbent position

Treatment. for several hours a day is to be strongly recommended, and either of the following mixtures :—

PRESCRIPTION 21

Bromide of potash	.	.	.	.	1½ drachms.
Solution of arsenic	.	.	.	.	24 drops.
Tincture of belladonna	.	.	.	.	40 drops.
Tincture of orange	.	.	.	.	2½ drachms.
Chloroform water to 8 ounces.					

An eighth part to be taken 3 times a day after food.

PRESCRIPTION 22

Citrate of iron and ammonia	.	.	.	.	80 grains.
Tincture of digitalis	.	.	.	.	80 drops.
Tincture of belladonna	.	.	.	.	80 drops.
Spirits of chloroform	.	.	.	.	2 drachms.
Water to 8 ounces.					

Commence with a tablespoonful twice a day, and gradually increase the dose to two tablespoonfuls three times a day.

Other forms of treatment are also employed with success, but must only be carried out under medical supervision. For instance, electrical treatment, the Weir-Mitchell treatment or rest cure, feeding with the milk of an animal whose thyroid gland has been removed, or the injection of the blood serum of an animal so prepared. Operation on the neck-swelling has in some cases been followed by recovery.

MYXŒDEMA

This disease was first described in 1873, and presents a remarkable contrast to that just described, for it is considered to be due to an absence of the secretions of the thyroid gland; and an exactly similar condition occurs when the gland is removed on account of disease. The name denotes œdema or dropsy arising from the accumulation, not of watery fluid, but of *mucus*.

The affection is met with in adults, generally women, but a very similar complaint occurs in children at or shortly after birth.

The whole body becomes swollen, the face especially being enlarged, heavy looking, and expressionless. The mental condition is peculiar:

Symptoms. the thoughts are dulled, the speech slow and laboured,

and all the movements of the body are carried out slowly and languidly. The progress of the complaint is very gradual, and the tendency is for the malady to grow worse unless checked by treatment.

Since the cause was discovered to be a deficiency in the secretion of the thyroid gland the disease has been treated with entire success by giving to the patients calves' thyroids to eat, or extract of thyroid glands in the form of medicine. Tablets of the extract are now prepared containing from half a grain to five grains in each ; this is a very convenient form in which to take the drug. It is well to begin with a small dose, about a grain and a half taken three times a day after meals, and gradually to increase it up to five or six grains three times a day. The improvement as the result of this treatment is truly marvellous, but unfortunately it only lasts as long as the remedy is being taken, and all the symptoms return when it is discontinued. It is necessary therefore to return to the use of the drug at regular intervals.

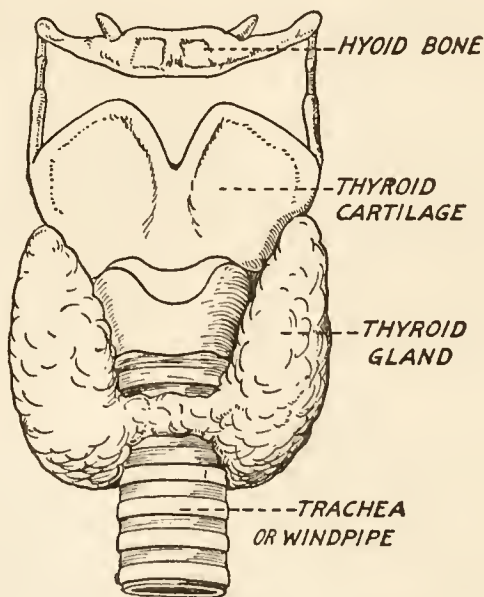


Fig. 1.—THE THYROID GLAND,

CHAPTER III

THE DIGESTIVE ORGANS

Effects of Cooking—The Mouth—Swallowing—The Stomach—The Duodenum—
The Small and Large Intestines—Liver, Pancreas, and Spleen—Peritoneum
—The Various Stages of Digestion.

BEFORE dealing with the diseases of the organs of digestion it will be necessary to know what these organs are, and what they do, for it is impossible to understand their faults and failures until we have a fair knowledge of their ordinary every-day duties.

The organs of digestion may be looked upon as a long tube with many twists and turnings, and with some large dilatations in it, but a continuous passage from one end to the other, and with no opening from it into the body. These organs are the mouth, the gullet, the stomach, the small and large intestines, forming the alimentary canal, and certain accessory organs called the liver and pancreas.

The food, whilst in the alimentary canal, as it is called, is to all intents and purposes outside the body, and it is the duty of the digestive organs so to alter it that it may be able to pass from the alimentary canal and find its way into the body.

What, then, is the purpose of digestion? It is to render all the articles of our food soluble, to make them fluid. It is obviously impossible for bread and meat to enter directly into the blood and supply food to the structures of the body; they must first be dissolved, and it is the various means by which the food is dissolved that make up the process of digestion.

Cooking must be looked upon as the first stage of digestion. By it animal foods are softened, moistened, and broken up; whilst in vegetable

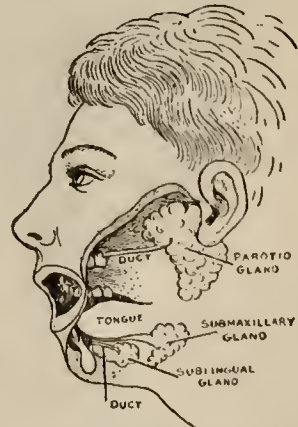


Fig. 2.—THE SALIVARY GLANDS.

foods, what is called the cellulose is softened. Now, considering that all starchy foods consist of a number of small granules enclosed in a thin coating of cellulose, and that the digestive juices have hardly any action upon this substance, the importance of the cooking is evident. As the starch granules are cooked they rapidly swell, and the softened cellulose covering bursts, so that the starch is exposed to the surrounding fluids.

Effects of Cooking.

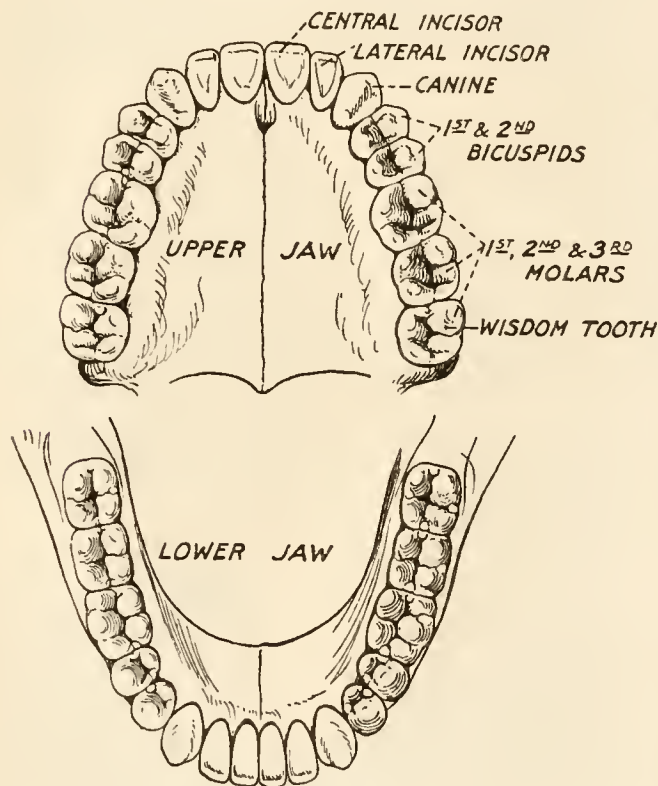


Fig. 3.—THE TEETH.

The next stage in digestion takes place in the mouth. This may be defined

The Mouth.

as a cavity lined by mucous membrane, into which is poured the saliva, a secretion formed by three pairs of glands — the parotid, situated on the side of the face in front of the ears, the submaxillary under the angle of the lower jaw, and the sublingual under the tongue (Fig. 2). It is also supplied with an elaborate grinding apparatus, represented by the teeth. These are of three varieties: the front teeth or incisors are thin and sharp, and are meant for cutting the food;

the pointed one on each side of these, the canine tooth, is very strong and is formed for tearing, whilst the remaining teeth, the bicuspid and molars, are used for crushing and grinding the food (Fig. 3).

In vegetable-feeding animals, or herbivora, the molars or grinders are chiefly developed, in flesh-feeders, or carnivora, the canines and incisors, while even the molars are modified so as to present a cutting edge. In the human mouth all three varieties are present, thus indicating the suitability of a mixed diet for human beings.

The food, whilst in the mouth, is broken up and ground small by

the teeth, and intimately mixed with the saliva by the movements of the jaw and tongue. This process of *mastication* develops the taste of the food, which is chiefly perceived by the tongue, at the base of which special taste organs are situated (Fig. 4). The sense of smell also comes into play, and it is difficult to distinguish between the articles we taste and those we smell.

The *saliva* is a clear, transparent watery fluid, and is mixed with the mucus of the mouth, and made frothy by the movements of mastication. It is alkaline, especially whilst digestion is proceeding; and although it is always being formed it is poured out in greater quantity during digestion. From 1 lb. to 2 lb. is produced in twenty-four hours. It contains a substance called *ptyalin*, and also salts in abundance.

The food, having been well masticated and moistened, is formed into a mass and pressed backwards by the tongue, until it is taken possession of by the muscles of the pharynx, or throat. The

morsel of food, whilst being conveyed through the pharynx, is prevented from passing upwards into the nose by a fleshy curtain called the soft palate, which, with its small central projecting portion or uvula, is

Swallowing. drawn backwards and upwards, and completely fills the nasal opening. This action sometimes fails, as in the paralysis of the soft palate which often occurs in diphtheria, and food then returns through the nose. Again, the food is prevented from passing into the windpipe by an exceedingly sensitive little flap or lid called the epiglottis, which shuts down momentarily whenever it

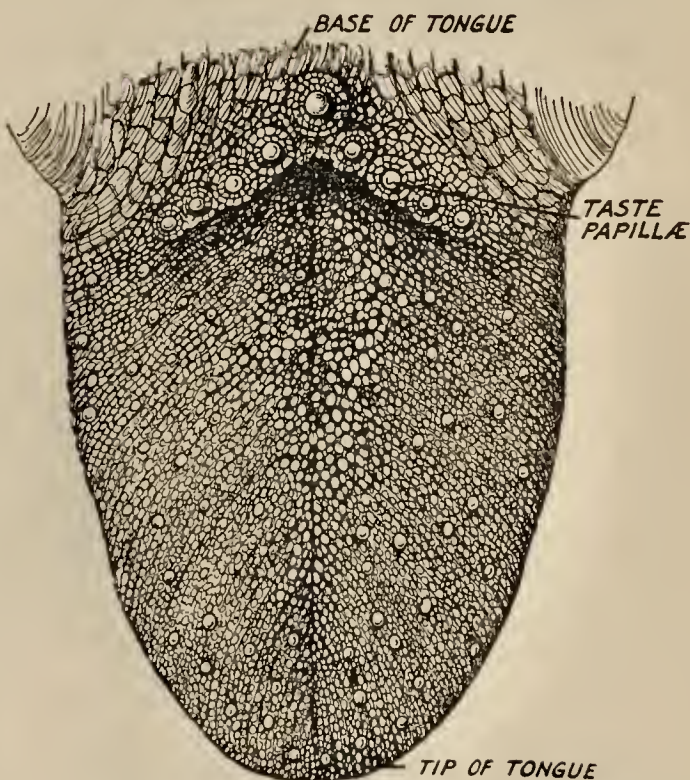


Fig. 4.—THE TONGUE.

perceives anything approaching the opening (Fig. 5). When it fails to do its duty we experience the uncomfortable sensation of "something going the wrong way."

Having passed through the various perils of the pharynx, the morsel of food is seized by the muscles of the gullet, and handed along it by contractions of its muscular wall, until it arrives in the cavity of the stomach (Fig. 6).

The stomach is the first and chief of the dilatations of the alimentary canal. It forms a bag, the capacity of which varies with age (in a new-

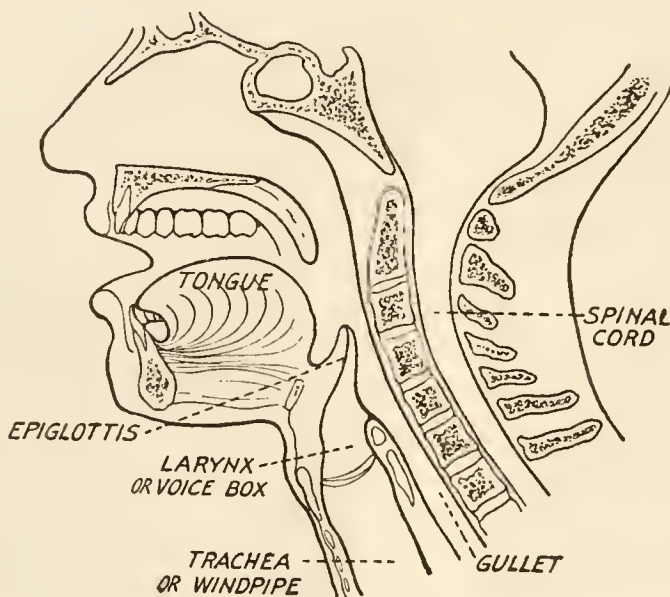


Fig. 5.—THE EPIGLOTTIS.

born baby it holds about four or five tablespoonfuls); it also varies according to its state of activity, whether full or empty, and in a state of health its muscular walls keep it fairly well contracted on its contents. It is slung, as it were, across the upper part of the abdomen, from left to right, and has two openings, one, by which the food enters, to the left and near the heart, for this reason called the cardiac orifice, and the other to the right and under the liver, called the pylorus or pyloric orifice. When the stomach is empty its lining or mucous membrane is thrown into a number of folds, but these disappear when it is distended with food. All over the mucous membrane are little glands which secrete the digestive gastric juice. The entrance of food into the stomach is accompanied or even preceded by a great

flow into its cavity of this gastric juice, which in health is always acid from the presence of *hydrochloric acid*. It also contains a substance called *pepsin*, which plays a most important part in the digestive process, and acts as a ferment. The muscular coat of the stomach keeps up a churning movement of the organ, and thoroughly mixes up the

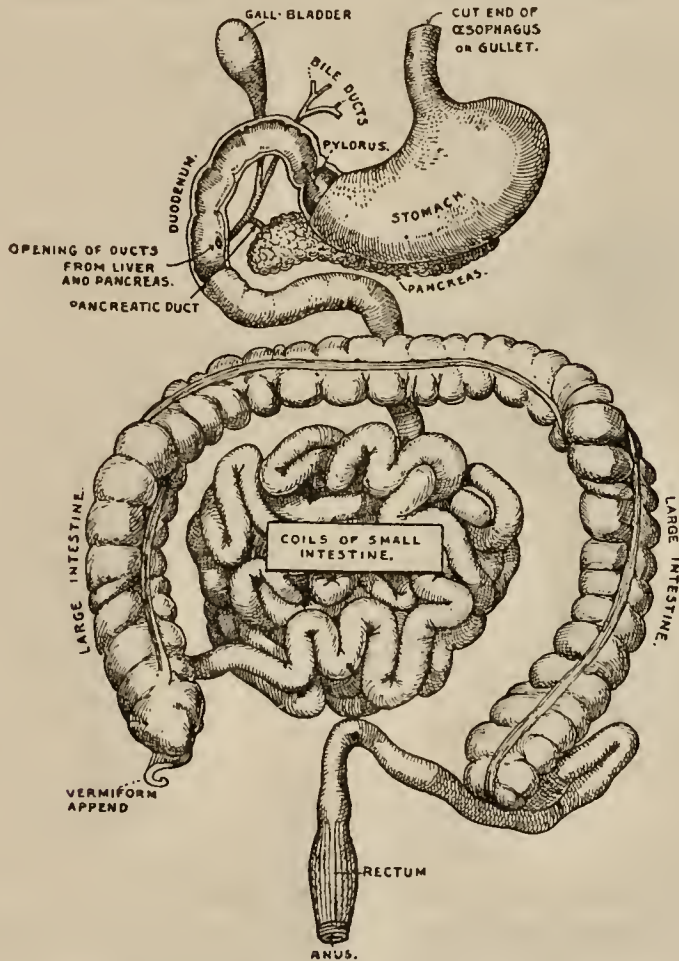


Fig. 6.—THE ALIMENTARY CANAL.

food with the gastric juice, and finally presses it through the pyloric opening into the small intestine (Fig. 6).

The pylorus is a sort of valve, formed of a ring of muscle, which only opens when the food in the stomach is sufficiently digested and ready to proceed on its way.

The intestines or bowels are a long tube formed into many coils. The first part, much the smaller, is called the small intestine, and is

twenty feet in length; the lower part, of much greater girth, is called the large intestine or colon, and is five feet long.

The first part of the small intestine must receive separate notice from the remainder; it is called the duodenum, as it is in length about twelve fingers' breadth. In it are two openings, which are the terminations of little tubes or ducts that convey juices from the liver and pancreas. The food as it passes from the stomach into the duodenum is quite fluid, and partially digested, and receives the name of *chyme*. In the duodenum it

**The
Duodenum.**

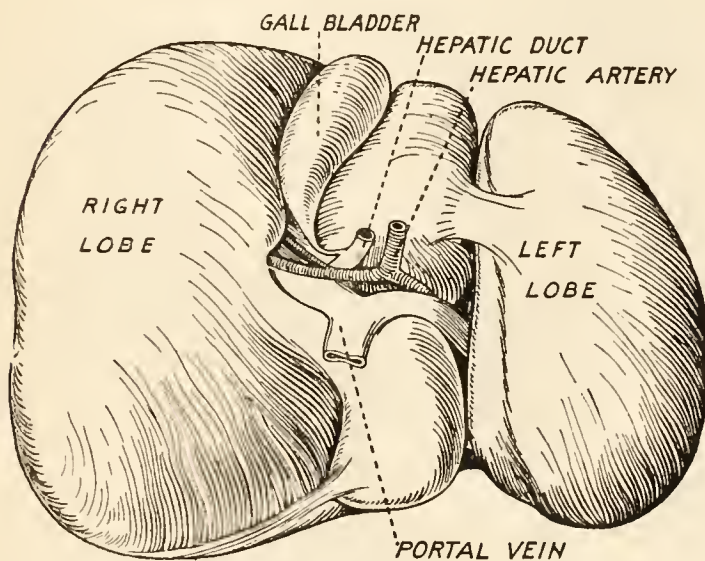


Fig. 7.—THE LIVER.

meets and is thoroughly mixed with the juices from the liver and the pancreas.

The half-digested food, mixed with the liver juice or bile,

**The Small
Intestine.**

the pancreatic juice, and the intestinal juice, and now called *chyle*, is carried along the small intestine, and the process of digestion is complete. It gradually loses its fluid portion

by absorption into the blood vessels, and finally the more solid and indigestible part reaches the large intestine.

This portion of the bowel begins low down in the abdomen on the right side, and forms a sort of horseshoe passing just under the stomach and down on the left side until it ends in the rectum.

**The Large
Intestine.**

Where the small intestine empties into the large there is a valve, and it is at this point that the vermiform appendix is situated (Fig. 6). The large bowel is chiefly engaged in taking up the remaining fluid and digested portion of the food. In it, in human beings, very little digestion occurs, but in herbivorous animals it is engaged much more in the process of digestion, and that portion which is situated near the valvular opening from the small intestine is greatly

developed, forming quite a large bag ; in human beings this part has become useless, and has shrivelled, only a vestige being left, the appendix.

The liver is a large solid organ, weighing from fifty to sixty ounces, and is the largest gland in the body. Most persons realise the import-

The Liver. ance of the liver, and the effects which its failure to do its duties has upon the body at large, and upon the character in general. It is made the scapegoat for all sorts of indefinite complaints both by doctors and by patients. In many instances probably the charges are false, or at any rate must be looked upon as "not proven," but there is no doubt that good health is impossible without an efficient liver. It is situated in the upper part of the abdomen, chiefly on the right side, and is fairly well hidden under the ribs. This situation of the liver has given rise to the expression *hypochondriac*, meaning "under the cartilages," and is applied to those persons who imagine themselves always ailing. The solid substance of the liver is permeated by a great number of fine ducts or tubes, which gradually grow larger by uniting with one another until they form a single channel, called the hepatic or liver duct, which carries the secretion of the liver (bile) into the small intestine. On its way from the liver to the intestine another duct meets it which comes from a bag called the gall-bladder. This bag acts as a reservoir for the bile when the digestion is at rest. It is in this bladder (Fig. 7) that gall stones are formed.

Bile or gall is formed by the liver constantly, but more copiously during digestion ; about two and a half pints being secreted daily. It is a yellow or brownish-yellow fluid, thicker than water, alkaline in reaction, and bitter in taste. Although "bitter as gall" is a common expression, it is believed that pure fresh bile is not bitter, and that it derives its flavour from substances formed during digestion ; but when vomited it is certainly characterised by intense bitterness. Its colouring matter is obtained from the blood, and imparts its tint to the contents of the bowels, which become pale and clay coloured when bile is absent.

The liver has a peculiar arrangement of blood vessels. It has two distinct sets, one set which supplies it with nourishment like any other organ, and another which passes from the intestines to the liver, and carries blood full of the products of digestion which have just been formed in the intestines. We shall have more to say about this when describing the digestive processes.

The pancreas or sweetbread (Fig. 8) is another gland, which is situated below the stomach, and from which a duct carries its secretion—the pancreatic fluid—to the intestine, entering the duodenum at almost the same spot as the bile duct (Fig. 6).

The spleen is a solid organ placed to the left of the pancreas, and just below the stomach; it is of more importance in the formation of blood than in the process of digestion (Fig. 8).

Over all the organs we have now described is spread a smooth, shiny, moist membrane called the peritoneum; it forms the inner layer of the coverings of the bowels, the mucous layer being the exterior, and the muscular layer the middle one. By means of its smooth

and moist surface the peritoneum allows the bowels to glide freely on one another in the movements of digestion.

These, then, are the organs of digestion, and in order to understand the different stages of this process it will be necessary to follow the food as it traverses its long and

devious course. The processes of digestion have been likened to a factory: the food, representing the raw material, is subjected to many elaborate chemical processes, and the finished products resulting therefrom are the soluble materials which pass out of the alimentary canal into the body, and are capable of nourishing it.

First we must understand that all foodstuffs can be grouped under five headings, namely: (1) water, (2) nitrogenous food, meats or proteids, (3) carbohydrates, or sugar and starch, (4) hydrocarbons, or fats, and (5) mineral foods, or salts.

The food is finely divided in the mouth by the act of mastication, and mixed up with the saliva. The digestion of the starchy food begins here, the salivary ferment called ptyalin having the power of changing the insoluble starch into soluble sugar; the starch jelly, into which

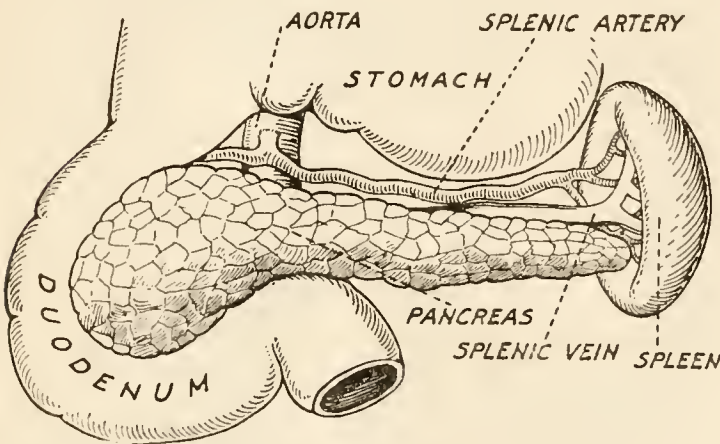


Fig. 8.—THE PANCREAS AND THE SPLEEN.

the farinaceous food has already been changed by the process of cooking, is liquefied and rendered ready for absorption. By a wonderful

Digestion in the Mouth. provision of nature the amount of saliva secreted depends entirely upon the nature of the food taken into the mouth and the amount of mastication required. Sopped bread and soft puddings, requiring less mastication than dry food, such as crust of bread and toast, cause the secretion of a much smaller amount of saliva. In animals whose food is uncooked, and therefore cannot be acted on by saliva in the mouth, the ptyalin ferment is almost absent.

The food is now swallowed, and passes through the gullet without further change. In the stomach the change of starchy food into sugar continues, until by the churning movements of the stomach it is passed along towards the pyloric end.

In the stomach also the food is well mixed with the gastric juice. This juice has already begun to flow before the food reaches the stomach, for the mere sight or smell of food acting through the nervous system starts its production, and the taste of food does so still more. The only articles of food which will produce a flow of gastric juice by their introduction into the stomach are water and extractives of meat. Now, as these are just the ingredients of soups, the wisdom of beginning our dinner with soup is obvious. The gastric juice is a clear transparent fluid, without smell, a little saltish, and decidedly acid, and it contains three active substances—(1) hydrochloric acid, (2) the ferment called pepsin, and (3) a ferment called rennin, which curdles milk. From ten to twenty pints of it are poured out in the twenty-four hours.

Digestion here begins on the nitrogenous or proteid foods. The movements of the stomach break up the food and mix it well with the gastric juice, and the proteids, which are insoluble substances (such as meat fibre and gluten of bread), become altered into peptones, which are soluble, and can be absorbed readily into the blood vessels. When the semi-digested food, the chyme, passes through the pyloric opening of

Digestion in the Intestines. the stomach into the duodenum, it there meets with the bile secreted by the liver, the pancreatic juice, and the intestinal juice. By these the process of digestion is completed. The starch which has remained unaltered is converted into sugar, the nitrogenous foods are also disposed of and made soluble, and finally the fats are digested.

This last process is a difficult one, for the fatty foods cannot be made soluble ; they are, however, by the bile, pancreatic and intestinal juices, working together, made into an emulsion, a condition in which the drops of fat are broken up into very minute globules.

The bile is also a powerful antiseptic, preventing decomposition of the food in the intestines. It encourages the formation of the other juices, and promotes the onward passage of the contents of the bowels by increasing the movements of the tube.

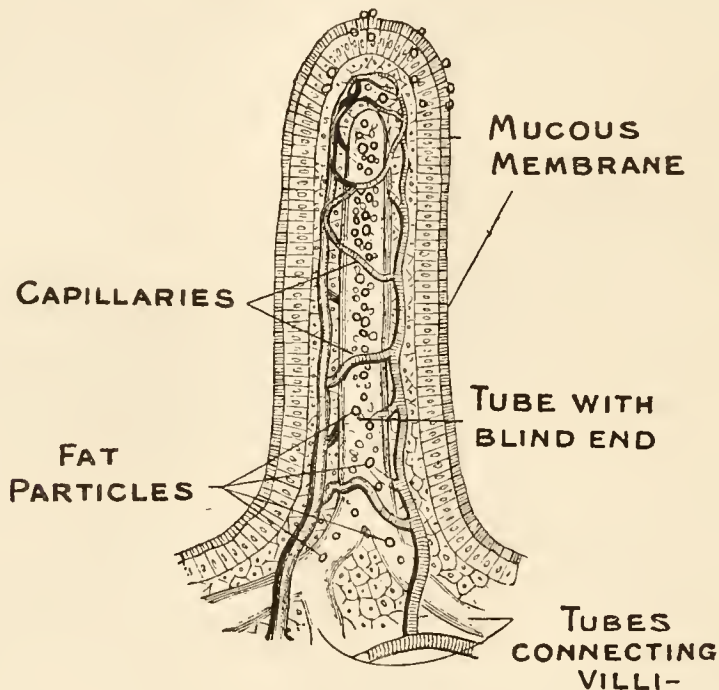


Fig. 9.—A VILLUS, HIGHLY MAGNIFIED.

We have now all five divisions of food stuffs in a soluble condition—the water, which requires no change ; the salts, which are already dissolved in the water ; the starches, which are converted into soluble sugar by the saliva and pancreatic juice ; the nitrogenous foods, which are converted into soluble peptones by the gastric, pancreatic, and intestinal juices ; and the fats, which are broken up into an emulsion by the bile and pancreatic juices.

The first four of these are absorbed through the walls of the small intestine directly into the blood vessels, and carried by them to the liver, but the fifth class, the fats, are absorbed in a different and more complicated way.

If the mucous membrane that lines the interior of the small intestine is examined under a magnifying glass it shows a peculiar velvety surface.

Absorption of Fat. The pile of this velvet coat is formed by an immense number of small conical processes, which are called villi (Fig. 9).

They are largest and most numerous in the upper part of the small intestine. It has been calculated that their total number is at least four millions. The structure of these little processes is interesting. In the centre is a minute vessel in the form of a hollow tube, with a blind end at the extremity of the process and communicating at its base with other vessels; around this is a layer of muscular fibres, and outside this, on the surface of the villus, are several layers of cells. The fat globules cannot escape from the bowel directly into the blood like the other varieties of food which have been rendered soluble, and they have therefore to be removed by the villi in the following way: The surface layer of cells proceed to swallow each little fat globule, passing it through themselves on to the next layer of cells until it finally lands in the central tube. When this is full of globules of fat the muscle which surrounds it gives it a squeeze until its contents are forced into the vessels below, and then releases it again so that it can refill, acting to all intents and purposes like a minute force-pump. The fat is carried from the vessels at the base of the villus to larger vessels, until it finally reaches a large vein immediately behind the left collar-bone, where it enters the general blood stream. The capillaries shown in the illustration (Fig. 9) are minute vessels which pass the blood from the arteries to the veins.

The contents of the bowel, now destitute of all nourishing material, pass along the large intestine, being gradually deprived of their fluid, and finally, consisting of waste products and indigestible material, are ejected.

The last process of digestion takes place in the liver. All the nitrogenous ingredients and carbohydrates (that is Classes 2 and 3 of the foods) are absorbed in their soluble form by the blood vessels of the intestine, and carried to the liver, which acts like a trap, and catches them all as they enter. It then transforms them into a substance called glycogen or animal starch, and stores them up in its substance until food is wanted by the body. After a good meal, as much as five per cent. of the liver consists of this substance. By this means we have a wonderful provision for regulating the supply of food to the various parts of the body, which is of especial

Digestion in the Liver.

importance to the muscles, for as these do so much of the body's work it would be a great disadvantage to them were they inundated with food directly after a meal, and then left for a long time without any at all.

The chief organs of digestion are contained in the abdomen, that portion of the body which is included between the chest above and the bones of the pelvis below. It is separated from the chest by a large muscle called the diaphragm or midriff (Fig. 10). The abdomen is popularly often spoken of as the "stomach," and this may lead to confusion, the stomach being, as we have explained, only a portion of the alimentary canal.

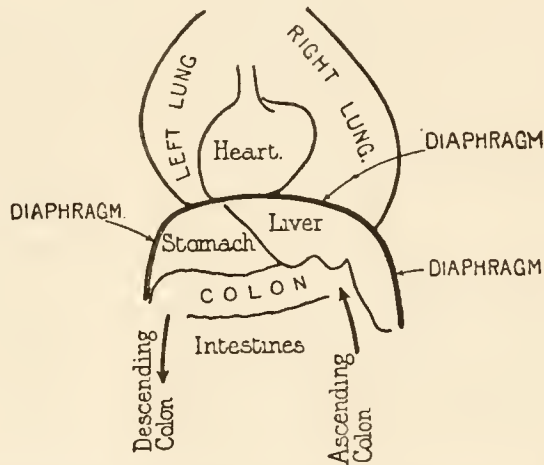


Fig. 10.—THE LINE OF THE DIAPHRAGM, FROM BEHIND.

CHAPTER IV

DISORDERS OF THE MOUTH, GULLET, AND STOMACH

Inflammation of the Mouth and Tongue—Offensive Breath—Stricture of the Gullet—Difficulty in Swallowing—Acute Gastritis—Chronic Gastritis—Gastric Ulcer—Cancer of the Stomach—Stricture of the Stomach—Dilatation of the Stomach—Indigestion—Eructations—Waterbrash and Heartburn—Hiccough—Vomiting—Vomiting of Blood—Loss of Appetite—Excessive Appetite.

INFLAMMATION OF THE MOUTH AND TONGUE

INFLAMMATION of the mouth and tongue used to be of quite common occurrence in old days, when it was the habit to give mercury in long-continued and large doses, until the mouth was made sore, and an enormous amount of saliva was poured out by the glands. This was called salivation, and it was purposely induced with the idea that the benefit of treatment by mercury was not obtained until these severe symptoms had appeared. With the increased flow of saliva, or generally preceding it, there were a "coppery" taste in the mouth, tender gums, and offensive breath. The tongue became large and flabby, and occasionally the gums ulcerated and poured out a large quantity of disagreeable discharge. Even now such symptoms in a modified form are met with in persons very sensitive to the action of mercury and iodide of potash.

The treatment consists in at once stopping the use of these drugs, and in flushing the mouth frequently with the following wash :—

PRESCRIPTION 23

Chlorate of potash . . .	1½ drachms.
Boracic acid . . .	2 drachms.
Tincture of myrrh . . .	1½ drachms.
Water to 8 ounces.	

Make a mouth wash, to be mixed with an equal quantity of warm water.

Inflammation of the mouth and tongue is nowadays practically only found in delicate children, especially those reduced by severe illness, and it will be found described amongst children's diseases. There is,

however, a condition met with in adults in which inflammation and very painful little sores or ulcers are present in the mouth. It is either the result of bad hygiene, especially the inhalation of sewer gas, or is caused by indigestion. The treatment in such cases is to avoid the cause, treat the indigestion, and use the mouth wash just prescribed.

Another form of inflammation of the mouth chiefly affecting the gums, in which the teeth, often perfectly healthy, loosen and drop out one after the other, is described under disorders of the teeth.

OFFENSIVE BREATH

This is one of the most trying conditions, for the person affected as well as for his companions, and is almost enough to deprive even the most agreeable individual of his friends. It is not, of course, a disease in itself, but is a symptom of a large number of very different conditions, some quite unimportant and perfectly easy to cure, whilst others are not only serious but threatening to life.

In the first class we must place affections of the mouth and throat, and the most common of these are unhealthy conditions of the teeth and gums. In many cases, through want of cleanliness and forgetfulness to clean the teeth regularly, they become covered with tartar and collect food in their cracks and crannies, the food rapidly decomposing and scenting the breath most offensively. Decayed teeth are always liable to give off a disagreeable smell, and they also irritate and inflame the gums and produce an offensive discharge.

Sore throats, either acute, with ulceration and discharge, or long-continued inflammation of the tonsils with unpleasant-smelling discharge, also give rise to this symptom. In certain cases there is a constant discharge from the nose, which nothing seems to cure. On careful examination it is found to come from a large cavity in the bones of the cheek, which leads by a small opening into the nose. If inflammation of the lining of this cavity, which is called the antrum, is set up by cold or otherwise, there is a discharge, and while some of the fluid runs out of the nose some is always retained in the cavity, because the opening from it is not on a level with its floor. The retained discharge decomposes, and gradually escapes into the nose, producing one of the most offensive smells imaginable.

The treatment of offensive breath, when due to disease of the throat and mouth, is simple. A dentist must be consulted, and the decayed

teeth stopped or extracted, and the tartar and accumulated food removed. The mouth must be washed out with pleasant-smelling

Treatment. antiseptic washes, and the same must be used as gargles if the throat is affected. The most careful cleanliness must be observed for the teeth, a good scrub with the tooth-brush twice a day with tooth powder and mouth wash being advisable.

The trouble with the nose requires surgical attention, as it is usually necessary to enlarge the opening into the nose so as to bring it down to the level of the floor of the cavity, and give a free escape to the discharges.

The following make good mouth washes: Condyl's fluid and water (sufficient of the fluid being added to warm water to make it a faint purple colour), or Listerine, or Odol, or the following:—

PREScription 24

Powdered boracic acid	.	.	1½ drachms
Tincture of myrrh	.	.	2 drachms
Water to 8 ounces.			

Make a mouth wash; to be used warm.

It is a somewhat curious thing that some persons suffer from offensive breath without any apparent cause. The condition is sometimes noticeable in women at certain periods, and seems to pass off naturally in course of time. Certain habits, too, scent the breath, such as tobacco smoking and chewing, or "nipping" alcoholic drinks. As a result of this latter habit the breath gets a peculiarly heavy, sweet, sickening smell, quite characteristic, and altogether distinct from the smell of fresh spirits. Then again there are the smells of a crowded third-class carriage on a Bank holiday, due to indulgence in such luxuries as peppermint, onions, oranges, and garlic.

Causes of the second and more important class are connected with affections of the digestive organs, especially chronic indigestion and constipation. When the offensive breath is due to indigestion the treatment recommended on a later page for that complaint must be employed, but distinct benefit will be obtained by using charcoal, either five grains of powdered charcoal or a charcoal biscuit. Constipation must be removed by appropriate aperients, and it is well in robust persons to start with two or three grains of blue pill, followed the next morning by a dose of Epsom salts.

The causes connected with the respiratory organs are the most serious.

One is a condition called bronchiectasis, in which the bronchial tubes become dilated into cavities in which matter stagnates and putrefies ; another the formation of cavities in the lung in the course of consumption, and a third is gangrene or mortification of the lung. In these three conditions the smell may be truly awful. Some relief can be obtained by antiseptic inhalation, but the diseases are too serious for domestic treatment.

Lastly, we may just mention the peculiarly-scented breath which occurs in some diseases. In diabetes there is a sweet heavy smell likened to new-mown hay or an apple loft ; in pyæmia, a form of blood poisoning, it is somewhat similar, and in cases of Bright's disease, especially if complicated by a condition known as uræmia (urea in the blood), it is like ammonia or even urine. These conditions require no treatment apart from the diseases causing them.

• STRICTURE OF THE GULLET

There are not many diseases of this portion of the digestive canal that need consideration. The most important are the various forms of stricture or obstruction. This may be caused by inflammation, which by producing ulceration and ultimate scarring contracts the tube in some part of its course.

The inflammation has in almost all these cases been caused by something introduced accidentally by way of the mouth, such as very hot water or strong caustic poisons, like carbolic acid or caustic potash, or by a hard foreign body, as false teeth or portions of bone in the food. Another cause of stricture is the growth of a tumour in the gullet, or the pressure on it by a tumour which is growing in the neighbourhood.

The symptoms in such cases come on very gradually, and neither the patient nor his doctor realises how serious is the trouble until the stricture has become quite tight. The first symptom to attract attention is difficulty in swallowing. At the beginning it is only noticed when the patient attempts to swallow a larger lump of food than usual, then with any solid, and finally with the finest solids, and even with liquids. The food is apparently swallowed in a natural way, but after a variable time it is rejected without any change having occurred in it or sign of digestion, and by the litmus paper test (which will be explained in a later chapter)

it will be found to be alkaline, whilst if it had been in the stomach it would be acid. In the last stages swallowing becomes impossible, and the patient wastes rapidly and dies of starvation.

The only treatment is to keep the passage of the gullet open by passing at regular intervals a bougie. This must at first be done by

Treatment. a surgeon, but patients soon learn to do it for themselves, and are able to maintain a fairly satisfactory passage and take food in sufficient quantities to keep themselves in health. The food must of course be carefully selected, and consist of soft solids and fluids of as nutritious a nature as possible.

DIFFICULTY IN SWALLOWING (DYSPHAGIA)

Difficulty in swallowing is a symptom which is present in many different complaints; it occurs in all conditions which produce soreness

Causes. of the throat, and is then chiefly mechanical, and due to the pressure of the food on the painful part, or to something irritating in the food touching a sore surface. This symptom also is met with in "cold" in the larynx, or laryngitis, and is caused by the pressure of the food and by the movements of the larynx which always take place in the act of swallowing. In this condition it is often more easy to swallow soft solids like bread and milk than fluids.

Another cause of difficulty in swallowing is the paralysis or loss of power of movement of the fleshy curtain of the soft palate. This is of very frequent occurrence in cases of diphtheria; the palate not only loses its power of movement, but also all sense of feeling, and as a result ceases to perform its duties, which are to close the opening that leads upwards from the throat into the back of the nose. The consequence is that food is pushed upwards in the act of swallowing, and passes into the nose. The food for similar reasons is very likely to pass into the larynx and produce violent attacks of coughing and retching. This paralysis occurs more rarely in some nervous diseases.

In hysteria there is a sort of imitation of this condition, but it is really more of a nervous spasm of the muscles of the throat which prevents the patient from swallowing. The probable explanation of this trouble is that having once become persuaded that the food will stick half-way, the person becomes nervous, and the muscles contract and block the passage through sheer fright.

When the salivary glands are diseased, as in mumps, it often happens

that the mouth becomes very dry and parched from deficiency of saliva, and as a result the mouthfuls of food are not softened and moistened properly, and swallowing is difficult.

Lastly, in many affections of the gullet which are painful, swallowing is affected in different degrees, from simple difficulty to absolute impossibility.

Treatment must be directed to the cause of the condition, and will be described in other chapters.

ACUTE GASTRITIS

Inflammation of the stomach, gastritis or gastric catarrh, is not an uncommon condition, and is met with in two forms, acute and chronic. Acute gastritis is caused most frequently by taking [a strong irritant into the stomach, whether it be an active poison or some unsuitable food.

When a poison is drunk the symptoms come on rapidly, and are very acute—violent pain in the stomach, with vomiting and faintness, the patient being in extreme danger of his life.

If improper food is the cause the symptoms are more delayed, and are fortunately not quite so severe. The story of such an attack is

Causes. very similar in most cases. A man, who from his years ought to have reached the age of discretion, goes to a public dinner and there dines “not wisely but too well.” With a large amount of rich food he mingles several glasses of champagne. During the speeches he has several whiskies and smokes many large cigars. On his way home in the early hours of the morning he gets a good deal chilled, goes to bed, and perhaps to sleep, feeling decidedly uncomfortable. In a couple of hours he awakes feeling ill, with a sensation of great dis-

Symptoms. tension in his stomach, and difficulty in breathing. He brings up volumes of wind, which for a few minutes gives him relief; but the trouble returns, he gets faint and perspires freely, and finally gets out of bed and is violently sick. Having emptied his stomach he lies down and falls asleep. In the morning he may be quite himself, the vomiting having got rid of the irritating matter, or some of the offending food may have been retained and passed onwards into the lower part of his digestive organs. This continues to give trouble and may bring on an attack of diarrhœa, which carries off the irritant, and the stomach and bowels gradually resume their normal condition.

Such attacks are particularly liable to be met with in gouty persons,

and are caused as we have seen by over-indulgence, too large a quantity of food being taken, but without anything particularly wrong with it. Similar symptoms are often caused by tainted food, in which decomposition has commenced, such as stale sardines or other tinned meats and fish, and also by simply indigestible substances, as cheese or shell-fish. But above all these, an immoderate indulgence in spirituous liquors is apt to set up inflammatory conditions of the stomach.

The treatment of acute inflammation of the stomach must first be directed to giving the organ a complete rest from all its duties for a time,

Treatment. after it has once thoroughly emptied itself of all irritating material. The vomiting must, therefore, not be checked until there remains no more food in it, and it is often wise to encourage it for a time by drinking two or three glasses of warm water ; this also washes away the thick mucus or slime which often continues to be brought up by violent retching after all food has been cleared out. The slime also may be dissolved by adding to the last glassful of hot water a teaspoonful of bicarbonate of soda. If vomiting has not occurred the symptoms must be relieved by emptying the stomach before further treatment can be usefully adopted. To do this it may be found sufficient to irritate the back of the throat with the finger, or an emetic may be required, such as one or two cupfuls of chamomile tea (made by pouring a pint of boiling water on an ounce of chamomile flowers), or a tablespoonful of mustard in a tumbler of hot water.

After the stomach is emptied it must have a rest of from twelve to eighteen hours, no food being taken. If the thirst is very severe, small pieces of ice may be sucked, or hot water may be taken occasionally in sips. In cases in which exhaustion is very marked, teaspoonful doses of good brandy may be taken in the hot water, but this is not otherwise to be recommended.

Next a good purge is necessary to clear the bowels of troublesome contents, and undoubtedly the best is calomel. In the case of a strong adult three grains of this should be placed on the back of the tongue, either in tabloids or in powder, and washed down with a few sips of hot water, and the following morning a good dose of Hunyadi, Apenta, or other aperient water, or of Epsom salts, should be taken.

In some cases it is difficult to check the vomiting, and we should then try a hot compress or mustard and linseed poultice to the pit of the stomach, and a dose of the following effervescent mixture :—

PRESCRIPTION 25

Solution of bismuth . . .	2½ drachms.
Carbonate of ammonia . . .	24 grains.
Bicarbonate of soda . . .	2 drachms.
Dilute hydrocyanic acid . . .	16 drops.
Spirits of chloroform . . .	2 drachms.
Water to 8 ounces.	

An eighth part to be taken every 3 or 4 hours with a powder of
Citric acid 10 grains

When all severe symptoms have subsided and it seems advisable to begin to allow food again, it must be started with great care, and be taken in small quantities at a time, and at short intervals of about two or three hours. Fluids only must be taken at first, a choice being made from the following, namely, milk and soda-water equal parts, milk two parts and lime-water one part, barley-water, Bovril, chicken, mutton or veal broth, or beef tea, and later on arrowroot, Mellin's food, well cooked sago or tapioca, and bread and milk, taken somewhat in the order in which these foods have been mentioned.

To complete the cure it will generally be necessary to take some simple mixture, soothing to the stomach, for a few days, and the following will be found suitable :—

PRESCRIPTION 26

Carbonate of bismuth . . .	80 grains.
Bicarbonate of soda . . .	2 drachms.
Tincture of nux vomica . . .	80 drops:
Mucilage of gum . . .	4 drachms.
Tincture of cardamoms . . .	2 drachms.
Chloroform water to 8 ounces.	

An eighth part to be taken 3 or 4 times a day, before food.

If the pain is still severe it will be well to add to each dose

Solution of hydrochlorate of morphia . 7 drops.

CHRONIC GASTRITIS

Chronic inflammation of the stomach, or gastric catarrh, is a much commoner condition than the acute form. It affects men more often than women, and is a disease of middle age. When it occurs in children there is usually a distinct history of inheritance.

Its chief causes are connected with food : excess of food, especially of meat ; unwholesome food ; unmasticated food ; too frequent meals, and the abuse of alcoholic drinks.

Causes.

It is produced also by disease of other organs, such as chronic inflammation and congestion of the liver ; diseases of the heart, which interfere with the circulation of the stomach ; inflammation of the kidneys or Bright's disease, and habitual constipation. Previous attacks of acute gastritis engender a strong predisposition to it, and persons of a full habit of body or who suffer from gouty tendencies and general acidity show a special liability to be affected.

Chronic gastritis is one of the common forms of indigestion, and its symptoms and treatment will therefore be best considered under that heading (p. 77).

GASTRIC ULCER

Gastric ulcer, or ulcer of the stomach, is the name given to a peculiar sore which frequently occurs in the lining membrane of the stomach, and the cause of which is really unknown. One rather alarming suggestion has been made that under certain conditions the gastric juice is able to digest some portions of the stomach itself. But this can hardly be true, or ulcers would be found in those parts of the stomach where the food remains longest in contact with the mucous membrane, which is not the case, and also it would be found with special frequency in children, in whom digestion is far more energetically performed than in adults. Age has a very marked influence on its occurrence. Almost unknown in childhood, it becomes gradually more frequent as age advances. But the increase in the frequency of its occurrence does not affect the sexes equally, for women suffer from it three times as frequently as men. It is not at all an uncommon complaint in young women, especially in those who are anæmic. Certain classes are more prone to it than others, for want of food, mental anxiety, and other depressing conditions are undoubtedly predisposing causes, and, as we might expect, it is the poor, hardworked, and badly fed who are chiefly affected, especially seamstresses and poor servant girls.

These ulcers are round or oval and vary in size from a threepenny bit to half a crown. They usually affect only the inner surface of the stomach, but may gradually grow both larger and deeper, and eat their way so deeply as to perforate the whole of the coats of the stomach, and allow its contents to escape into the cavity of the peritoneum, causing

most dangerous symptoms, and even death from acute peritonitis. But most gastric ulcers, although they give rise to much trouble and great pain, get quite well. Apparently many ulcers cause no distinctive symptoms, and are never recognised at all during life ; only being discovered by examination after death from some other disease.

The most prominent and frequent of the symptoms of gastric ulcer is pain, and this varies much in extent. At first the patient only com-

Symptoms. plains of an uneasy feeling after food, but as the ulcer grows worse the pain becomes almost constant and very severe. It begins sometimes directly food enters the stomach, but more generally after an interval of from fifteen to twenty minutes. It persists the whole time digestion continues, and only ceases when the stomach empties itself either onwards into the intestines or by vomiting, the latter being very common. Lying down gives relief in some cases ; in others stooping forward or lying on one side, the position varying according to the part of the stomach affected. The seat of the pain is usually the pit of the stomach, but it is not limited to this spot, and may, indeed, be felt anywhere in the upper part of the abdomen, or even in the back. The spot where the pain is felt worst is also usually excessively tender to the slightest pressure, and makes it impossible for the clothes to be worn even moderately tight. Vomiting, as we have said, is commonly present, though it may not occur immediately food is taken, but after the digestion has gone on for some time. This is because the sore spot is not in the cardiac end of the stomach where the food first enters, but at the pyloric end, only reached by the food some little time after digestion has begun. The vomiting is often preceded by nausea and a flow of saliva.

Curiously, although it is the mucous membrane of the stomach which is affected, the tongue is often quite clean and healthy-looking. The appetite, too, is in many cases unaffected, and many of the younger patients say they could eat as much as usual if it were not for the pain that the taking of food produces, and this is likely to make them think that their complaint is unimportant, and "only neuralgia," and leads to neglect of treatment early in the case.

One symptom, however, which immediately excites alarm is bleeding from the stomach. This occurs in a certain number of cases, and then makes us feel pretty certain of the presence of an ulcer. If only a small quantity of blood is lost it may not be brought up by vomiting, but

passes downwards into the bowels, and makes the motions black, and even thick and tarry. Through want of observation the loss of blood in this way may continue for some time unrecognised. But a violent hæmorrhage may occur, and large quantities of bright blood be brought up by vomiting, which may be sufficient to cause faintness or even alarming collapse, and will certainly if frequently repeated produce extreme anæmia. Symptoms of dyspepsia come on during the illness, such as a feeling of weight in the pit of the stomach, flatulence, and eructation of extremely acid fluid. The bowels are generally confined, and the stools are hard, mixed with mucus and perhaps blackened with blood.

As we have already mentioned, the ulcer may eat through the coats of the stomach and cause perforation, as it is called. Sudden pain at the pit of the stomach, and a sensation as if something had given way inside, followed by a general pain all over the abdomen, which becomes much swollen and very tender, are the symptoms of this accident. The patient is very ill, suffers from collapse, faints, and breaks into a cold perspiration. This is so dangerous a condition that death often follows in two or three days.

Of course a doctor should be sent for at once, and in the meantime the patient must be kept absolutely at rest on his back, and nothing, not even water, should be given by the mouth. If it is impossible to get a doctor, opium must be given in an enema, thirty drops in a couple of ounces of warm water, and the absolute rest and starvation continued; half an ounce of brandy may be added to the enema to overcome the collapse. If the patient rallies, all food for several days must be given by the bowel.

It is not at all easy to decide when there is an ulcer in the stomach. The symptoms are often just those of an ordinary indigestion, but the pain coming on fifteen minutes after taking food, the presence of a very tender spot always in the same situation, and the occurrence of hæmorrhage, all point to the presence of ulcer. If an anæmic girl has any or all of these with other dyspeptic symptoms, it would certainly be wise to treat the case as one of gastric ulcer.

One condition to be distinguished from ulcer is cancer of the stomach, and there are sometimes great difficulties in doing so. However, the following particulars will be some guide. If the patient is under thirty years of age, if his general appearance is fairly healthy, and he has not wasted much, although the illness has lasted some time, if his condition

varies at different times and he does not lose ground steadily and continuously, and if there has been free loss of bright blood, it is most probable that the disease is ulcer and not cancer. Fortunately in a majority of cases of gastric ulcer a favourable termination to the illness may, as we have hinted, be looked for under suitable treatment. The most common causes of death are perforation, hæmorrhage, and exhaustion—the last being due to either hæmorrhage or starvation.

Having decided that we have an ulcer of the stomach to deal with, what should be our line of treatment? First and foremost the patient

Treatment. must go to bed and stay there. Secondly, having secured

rest for the whole body we must provide rest for the stomach also. If we can succeed in doing this we shall give Nature every chance to heal the ulcer. There is no special drug that will do this, and all treatment must be directed to the above object. To give the stomach absolute rest it is of course necessary entirely to forbid all food, and this can and must be done in the worst cases, no food being taken by the mouth, and all nourishment given in the form of injections or enemata.

In less severe cases, and in the bad ones when they begin to improve, the food must consist of the simplest and least irritating articles. Milk is undoubtedly the best. It may be given alone but is lighter if mixed with lime-water, soda-water, or seltzer-water. It is even better borne if it is peptonised. If the milk causes vomiting butter-milk may be tried, or the unsweetened brand of Swiss milk, well diluted. There is no doubt that milk is the best diet, and the least irritating to the sore, and if it can be borne and taken in sufficient quantity it is all that is necessary to nourish the body and keep it going.

Sometimes milk is better taken if it is mixed with some starchy food, such as arrowroot, sago, tapioca, or cornflour. These must be well boiled, and they prevent the milk from curdling in large masses. Benger's food and malted milk are useful preparations, very light and easily digested. The former requires care in the making, and may be allowed to stand rather longer than is usual in order to pre-digest it to a greater extent.

Whatever food is chosen must be given in very small quantities, and frequently—a tablespoonful every hour, and the amount gradually increased to a teacupful every two or three hours. As things improve, or if milk is found impossible, meat extracts may be used, extracts of beef, mutton, veal and chicken, and, later still, beaten up eggs and light

milk puddings, the diet being gradually extended until ordinary simple food can be resumed. The food should, as a rule, be given warm, unless there is hæmorrhage, when only cold food is allowed.

The external treatment consists in applying hot fomentations and poultices to the abdomen in ordinary cases, and in those complicated by hæmorrhage a bladder or indiarubber bag filled with ice broken up into small pieces. For the treatment of complications *see* Vomiting of Blood (p. 91), Vomiting (p. 88), Perforation (p. 73), and Stricture of the Stomach (p. 76), the last being a remote complication which may follow the healing of an ulcer and contraction of the scar.

The medicinal treatment must aim at keeping the bowels acting regularly with Carlsbad salts, well diluted, or castor oil, and soothing the stomach with either of the following sedative mixtures, that containing morphia being used when the pain is severe.

PRESCRIPTION 27

Carbonate of bismuth	2½ drachms.
Solution of hydrochlorate of morphia	2½ drachms.
Magnesia	5 drachms.
Mucilage of gum	1 ounce.
Chloroform water to 8 ounces.	

A tablespoonful to be taken every 3 or 4 hours on an empty stomach.

PRESCRIPTION 28

Carbonate of bismuth	½ ounce.
Sugar of milk	½ ounce.
Lime-water	1 ounce.
Prepared chalk	80 grains.
Mucilage of tragacanth	½ ounce.
Water to 8 ounces.	

An eighth part to be taken every 3 or 4 hours on an empty stomach.

In anæmia iron is necessary, and the vegetable preparations of this drug, such as the saccharo-carbonate or ammonio-citrate (*see* Drugs and Prescriptions) are recommended as being least irritating to the stomach lining.

Gastric ulcer is falling more under the treatment of the surgeon as antiseptic methods become more certain. The ulcer may be altogether removed, or it may be relieved from all irritation of food passing over it, by the food being diverted through an opening made between the stomach and the small intestine. But these operations are naturally

accompanied by danger, and should not be adopted until medicinal treatment has been faithfully tried for many weeks without success.

CANCER OF THE STOMACH

This terrible disease is much less common than simple ulcer, but the stomach is more frequently affected by cancer than any other organ in men, and, with only the exception of the womb, in women. It is a terrible complaint, and would, a few years ago, have been hopeless, but now that surgical skill and surgical knowledge have made such advances great hopes may be cherished of permanent recovery as the result of operation and the complete removal of the growths. It exhibits an hereditary tendency, occurs more often in men than women, and generally in old age ; most common between sixty and seventy years of age, it seldom is met with before thirty or forty. Its cause is unknown. It is of course quite beyond domestic treatment, but as the success of an operation is increased by early recognition of the disease it will be well to consider what are the symptoms, especially in its early stage.

They come on very insidiously, and at first are simply those of indigestion, such as acidity, flatulence, and want of appetite, but if these occur in a person past middle age, and who has never **Symptoms.** previously suffered from indigestion, they should arouse suspicion. It is at this early stage that a careful expert examination of the stomach contents whilst fasting is of great value. There is almost always pain in the pit of the stomach, at first dull and gnawing, but gradually becoming severe and neuralgic ; it is felt both when the stomach is empty and when it is full, and is accompanied with a certain amount of tenderness, but less than that which accompanies an ulcer. Vomiting is common, and the vomited matter consists of food mixed with blood. Loss of appetite is marked, and there is steady and rapid loss of flesh and strength ; the latter is a most striking feature of the complaint, and excites alarm and attention more than anything else. The patient soon gets pale, ill, and sallow, and finally a lump forms in the stomach, which can be felt through the abdominal wall. But before this is found a doctor ought to have been consulted, as by this time the chances of a successful operation are much diminished.

STRICTURE OF THE STOMACH

May be caused by several conditions—cancer at one of its orifices, contraction of scars left after the healing of ulcers, or pressure from a

tumour. The symptoms will vary according to the cause, whether cancer, ulcer, or tumour, and the history of the case will guide us in forming an opinion on this point. When it is the entrance to the stomach which is affected, the symptoms are those we have described as caused by stricture of the gullet, whilst when the exit from the stomach (the pylorus) is diseased we shall get the symptoms of the disease producing the stricture combined with those of dilatation or enlargement of the stomach, to which we must next refer.

DILATATION OF THE STOMACH

Comes on gradually as a result of some narrowing of the pyloric opening or exit; this obstructs the passage of the food, which collects in large quantities in the organ and sets up irritation and dyspeptic symptoms, namely, weight at the pit of the stomach, with fulness and heartburn. A constant sense of craving referred to the stomach is not uncommon. Vomiting occurs, sometimes at long intervals, during which the stomach fills up, and then, without nausea, empties itself of enormous quantities, amounting at times to many pints. This fluid is dirty brown in colour, intensely sour, and usually very frothy. Under the microscope we find present the growths of the yeast plant, and a peculiar fungus called *sarcinæ*. Failure of nutrition naturally follows; the body wastes, and the strength fails.

Treatment must be directed chiefly to removing the cause; while careful dieting with simple nutritious food in small quantities may relieve the symptoms. Surgery is often of great use in dealing with this serious condition, especially in advanced cases.

INDIGESTION

Dyspepsia is one of the commonest of complaints, and is growing more and more frequent; it almost seems to be an accompaniment of civilisation and education, for the more civilised a nation the more frequently are its inhabitants a prey to this annoying and troublesome affection. Probably no disease takes more persons to the doctor, nor gives him more trouble to cure. Perhaps one of the chief reasons why indigestion and civilisation go together is because of the wear and tear, the hurry and anxiety, which civilisation brings with it. Many a business man is so worried and busy in his office that he neglects to take his meals at proper hours, and when he does get them

they are eaten in a hurry, without proper mastication or interval for leisure before he is off again with his mind immersed in business matters.

Again, civilisation brings with it cooks, and not only cooks but good ones ; it might be imagined that there could be no objections to a *good* cook, and yet it is the good cook who beautifully softens all the hard foods and carefully removes all the little indigestible particles and tough morsels, thus extracting many of the most useful things which would act as stimulants to the digestive organs, and encourage the muscular movements and the satisfactory progress of the food along the digestive canal. It is almost possible to imagine the time when civilisation and its cooks will make us quite independent of digestion altogether—when all foods will be taken in a concentrated form already digested in the kitchen, when only absorption of nutritious fluids will be necessary, or even when the digestive organs can be deposed, and prepared food injected on convenient occasions into our blood-vessels. That time, however, is not yet, and until it arrives we shall be constantly confronted with indigestion, and few of us can at present boast that we have never experienced its unpleasant sensations.

Bad cooks must also bear their share of blame, and they are unfortunately only too common. A bad cook may make the food actually tougher by cooking if this process is carried on at an improper temperature or continued for too long a time. The mode of cooking meat by baking is unsatisfactory, for baking has a peculiar effect on fat, especially mutton fat, converting it into a most irritating substance. Frying, too, may so coat the food with fat as to render it almost impossible for the saliva and gastric juices to come into actual contact with the substances upon which they should act. By bad cooking food is also rendered tasteless or even unpleasant, and thus one of the most useful stimulants of the juices, namely, pleasant flavour, is absent.

All flavourings and condiments are irritants to the stomach, and promote the flow of gastric juice, but if taken in excess will cause indigestion. Pepper, mustard, chillies, horseradish, and pickles must only be indulged in very moderately. High game is another dangerous food, and also ripe cheese, as they contain irritating substances which are good in very small quantities only.

The causes of indigestion, then, may begin outside the body altogether. The food may be bad and contain poisonous substances, or simply indigestible substances in large quantities ; it may be imperfectly cooked

or badly cooked, and thus be rendered indigestible. Some foods can be taken with impunity by many people, while on others they act almost as poisons. Pastry, various forms of fish and meat, mushrooms and some fruits, always bring on an attack of indigestion in certain people, and some articles of luxury, even when indulged in very temperately, may prove most deleterious. Chief among these are alcohol, tobacco, and tea. Alcohol is a direct irritant to the lining of the stomach even in small quantities, and especially when taken on an empty stomach. The fashionable gin and bitters, or gin cocktail, stimulates the appetite certainly, but it does so by irritating the stomach, and constant repetitions of this irritation will in time produce inflammation. Liqueurs and cheap sour wines are injurious for similar reasons. Tobacco is productive of dyspepsia only when used in excess, but it is impossible to say what is excess, for the effect of the drug varies so much in different people. In moderation it has a good effect, in that it encourages the secretion of saliva and the movements of the intestines, but it somewhat reduces the appetite, and in excess produces chronic gastritis, and even when it does not cause this affection it retards recovery from it. Tea and coffee are both found to retard digestion in the stomach, and the former is one of the most potent causes of dyspepsia among the poor, who drink it in large quantities and of inferior quality, and who seem only to enjoy it when it is hot and strong. The fact that tea which has stood a long time after being made contains a large amount of tannin is one explanation of its injurious effect, tannin being a powerful astringent to the coats of the stomach, and hardening many of the nitrogenous foods until they are almost like leather.

Many forms of food and drink may therefore produce indigestion from being of unsuitable quality, but the very best of foods may do the same if taken in unsuitable quantity, or under unsuitable conditions. Food may be taken in *excessive* quantity. There is no doubt that this error is very common; it is far more frequent for people to eat too much than too little, and it is wonderful upon how little some healthy active people manage to subsist with comfort. Unquestionably the appetite is much under the control of habit, and can be increased and diminished gradually in this way. A man who has accustomed himself to eat large meals is not satisfied with small ones, but if he gradually diminishes the amount of food he will find in course of time that his appetite is quite satisfied with the smaller quantity. The chief fault

in dietary in this country is that people eat too much animal food, and consequently it is the organs which have to alter and digest these articles of diet that suffer. The stomach becomes irritated and disturbed, the liver is upset, and biliousness and general ill-health are produced, giving rise to such symptoms as lassitude and want of energy, both muscular and mental, headaches, constipation, high-coloured urine with thick pink deposits, drowsiness, and skin eruptions. All of which are the direct result of excessive quantities of waste material in the blood.

Another common error in dietetics is the habit of taking too frequent meals. The stomach requires rest as much as every other part of the body, and if denied it will go "on strike," and indigestion is the natural consequence. An interval should be allowed between the time that the stomach has emptied itself of the last meal before the next one is taken. Take, for instance, the meals of an ordinary day, with the hours required for digestion:—Tea, bread ($3\frac{1}{2}$ hours) and butter (3 hours) at 8 o'clock; breakfast of eggs (3 hours) and bacon (3 hours) and bread ($3\frac{1}{2}$ hours) at 9 o'clock; luncheon of beef ($3\frac{1}{2}$ hours), bread ($3\frac{1}{2}$ hours), and pudding ($2\frac{1}{2}$ hours) at 1.30 o'clock; tea of bread ($3\frac{1}{2}$ hours) and butter (3 hours) and cake ($2\frac{1}{2}$ hours) at 5 o'clock; and dinner of salmon (4 hours), veal (4 hours), boiled potatoes ($3\frac{1}{2}$ hours), cabbage ($4\frac{1}{2}$ hours), and pudding ($2\frac{1}{2}$ hours) at 8 o'clock. It is clear that the stomach has not much time for rest even if we omit the extra food between meals, the second editions of afternoon tea, and the many indigestible condiments and delicacies which would probably form part of many people's dietary.

If we follow the food in its journey through the alimentary canal we shall discover many explanations of indigestion attacks. At the very threshold we find one of the most serious—imperfect mastication. This may be simply the result of want of time properly to bite the food, or of the bad habit many persons fall into of "bolting" it half chewed. The teeth also may be at fault; they may be decayed, or some may be missing and the opposing teeth have nothing to grind on, or the teeth may be painful, or the gums tender. The food is therefore not sufficiently divided and crushed, the saliva is not thoroughly mixed with it, and if the food is swallowed hastily there has been no time for the saliva to act upon it. The food enters the stomach in lumps so that the gastric juice cannot come into proper contact with it, and the movements of the stomach take a long time in breaking them up and dividing them. The result is that digestion is much delayed, and the

food remains much longer than it should do in the stomach, and there is great likelihood that fermentation will be set up. As the movements of mastication are one of the chief means of exciting the secretion of the saliva, this fluid is formed in insufficient quantity, and the changes which ought to take place in the starchy foods are imperfectly performed.

Again, the food whilst in the mouth may be mixed with poison. The gums are liable to a disease in which they become swollen, inflamed, and spongy, and when pressed upon exude a disagreeable discharge around the teeth; this discharge, like that produced by decayed stumps of teeth, contains large quantities of septic organisms which, mixed with the food, are swallowed and set up fermentative changes in the stomach.

We have now discovered many causes of indigestion which affect the food even before it enters the stomach, and which must all receive their appropriate treatment before we can possibly hope to cure an attack of indigestion.

Of the affections of the stomach many are accompanied with dyspepsia, and we have already described three of the most important, namely, ulcer of the stomach, and acute and chronic gastritis. The two latter might almost be called acute and chronic indigestion, from their chief and most characteristic symptoms.

In order to keep the digestive organs healthy, and the digestive fluids active and sufficient in quantity, the nervous system must be healthy, and there is no doubt that such nervous conditions as anxiety, fright, or excitement may act upon the digestive organs and produce indigestion. Everyone is familiar with the loss of appetite which occurs upon occasions of nervous tension, when bad news is suddenly received, an examination has to be gone through, and the like. The blood as well as the nerves must be healthy or indigestion develops. General debility and anæmia are fruitful causes of the complaint; indeed, there is a distinct variety which we may call the indigestion of weakness. It occurs in all debilitated conditions, however they may be brought about, whether by an attack of influenza or other severe illness, by simple anæmia, by temporary exhaustion produced by violent and long-continued exercise, or by other conditions too numerous to mention. On the other hand there is an indigestion of strength, chiefly met with in full-blooded and gouty people, whose blood is full of acidity and waste products which have accumulated in it instead of being carried off by the excretory organs.

Indigestion is often spoken of as a disease in itself, and from some points of view this is true, but it must be more correctly looked upon as only a symptom occurring in a large number of very various complaints. Dyspepsia, the technical name, means "difficult digestion," and includes all varieties of the affection without reference to the part affected or the exciting causes. It is obviously necessary to discover the cause of indigestion first, and what abnormal condition this cause has produced, before it is possible to decide what is the proper treatment to adopt.

What, then, are the chief symptoms of this complex condition? First, there is difficulty of digestion—some uncomfortable feeling during the process. In health we cannot tell by our feelings that **Symptoms.** we have a stomach, but in dyspepsia we know it only too well, for we experience all sorts of sensations, from a mere sense of weight and fulness to severe spasmodic attacks of colic. The pain may be in the pit of the stomach or in the back; it may occur before food, on an empty stomach, with a sense of craving, and may be relieved by food. This is common in debility, and is a sign of Nature's desire for nourishment. Or it may only come on after meals, either immediately after or when some hours have elapsed. If it comes on immediately after food it may be from the food irritating an ulcer or a very sensitive and neuralgic stomach; if fifteen or twenty minutes after, it may be due to the presence of an ulcer at the pyloric end of the stomach; if some hours after, it is probably a case of delayed digestion with excessive secretion of acid gastric juice and fermentative changes in the food. Heart-burn, waterbrash, eructations, hiccough, and flatulence are common symptoms, and nausea and vomiting are present in many cases. The appetite is almost always affected; there may be simple distaste for food, or an absolute repugnance. The tongue is furred, the breath offensive, the head is heavy and aches, and the complexion gets pale and "dirty." The bowels are irregular and troublesome, constipation alternating with attacks of diarrhœa. An alarming symptom is palpitation of the heart, produced by acidity and flatulent distension of the stomach, but although this causes great distress it is not serious or dangerous, for it is not due to heart disease, but to an alteration of the action of the organ, through the nervous system. In dyspeptic conditions the skin is often involved; red irritable spots of nettlerash break out over the body, and the nose may get red and pimply. Finally, the

body wastes through imperfect nutrition, the patient feels weak and ill, and there is depression and irritability.

First it will be necessary to remove any recognised cause, to study our digestions without being over-occupied with them, to take suitable

Treatment. food in a suitable way, and as far as possible to make meal-time an interval free from the worries of life, and with as pleasant companions and as pleasant surroundings as possible. Constipation must be relieved, and a dose of medicine taken in the morning if a satisfactory action of the bowels has failed to occur the previous day. The most suitable aperients are the various mineral waters, such as Hunyadi, Apenta, or Carlsbad, and they should be mixed with plenty of water as hot as it can be taken. Much benefit will be obtained by drinking a glassful of hot water in sips, whilst dressing in the morning. This washes out the mucus which has collected in the stomach during the night, and in this way improves the appetite for breakfast.

It is of the utmost importance to regulate the diet to the powers of the digestion, to take the simplest and most easily digested foods, which must be well cooked and free from rich, sweet, or highly seasoned dishes. The meals must be only three a day, and at regular hours, and with intervals of at least four or five hours. Food should be taken in great moderation, and the sufferer from dyspepsia should finish his meal before the appetite is fully satisfied, and should get up from the table feeling he could eat a little more with pleasure.

Mixed and varied diet is always best, and the following may be taken as an average sample. For *breakfast* a boiled egg or some fish with weak tea or, better still, cocoa or milk and water, and some stale bread or toast with very little butter. For *lunch*, lean meat or chicken, well-mashed potato, and spinach, dry toast or stale bread. For *dinner*, a little clear soup, lean meat, chicken, game, or fish, well-cooked green vegetables, a little stewed fruit or milk-pudding, and toast or stale bread.

All raw vegetables are difficult to digest and require careful mastication, salads, cucumber, and pickles being particularly undesirable. New bread, wholemeal bread, muffins, crumpets, and buttered toast are indigestible. Pastry and sweets generally are liable to set up acidity and fermentation, and it is well for dyspeptics to abstain from jams, preserves, and fancy sweets. They should also avoid fried and twice-cooked meats, and all salted, cured, and preserved fish and meat.

Next we must say a few words upon what to drink in dyspepsia.

It is well to limit the amount of fluid taken at meals to about six to eight ounces (there are twenty ounces to the pint), and if thirst is felt, to satisfy it as far as possible by taking a glass of hot or cold water half an hour before or a couple of hours after meals. A little alcohol is in some cases often a great aid to digestion, and a glass of sherry, or a small quantity of whiskey or brandy well diluted, can therefore be recommended, but sweet wines and malt liquors are best left alone. Occasionally a glass of bitter beer is found useful, as it encourages the appetite and increases the flow of gastric juice; lager beer and light ale may also be tried.

Tea is like poison to most dyspeptics, and if taken with meat is almost certain to disagree, as by its astringent action it toughens the fibres and makes them difficult to digest. With other foods it may often be taken without trouble. China tea can be recommended in preference to India or Ceylon tea. It should be freshly made, allowed to draw for less than five minutes, and not be taken too hot nor with much sugar. Coffee in moderation does no harm, and cocoa is both digestible and nutritious; but in some cases of indigestion neither can be taken, and the large amount of fat in some cocoas makes them unsuitable. It is possible, however, to obtain certain varieties of cocoa from which most of the fat has been removed.

Milk is, with some, the best of foods, and can be taken in large quantities and digested without difficulty, but many persons say—and occasionally with the truth of experience—that they cannot digest milk. In such cases it should be diluted with effervescing water, or barley-water, or have some lime-water added to it.

In the *indigestion of weakness*, to which we have previously referred, it is right for the sufferer to take any food that can be digested, and to occupy the mind with the matter as little as possible. It is in these cases that tonics are most useful, especially those that contain vegetable bitters, as gentian, calumba, cinchona bark, and, above all others, nux vomica.

A good mixture is—

PRESCRIPTION 29

Tincture of nux vomica	.	.	.	80	drops.
Carbonate of bismuth	.	.	.	80	grains.
Mucilage of gum	.	.	.	4	drachms.
Tincture of orange	.	.	.	2½	drachms.
Chloroform-water to 8 ounces.					

An eighth part to be taken 3 times a day, 10 minutes before meals.

Constipation must be corrected, if present, and liquid extract of cascara, 10 drops, should be added to each dose of the mixture.

If anæmia is marked, iron pills or tabloids should be taken after each meal, a good prescription being tabloids of iron with arsenic and strychnia.

Change of air and a visit to some spa often complete the cure.

In the *indigestion of strong persons with gouty tendencies*, in which pain comes on from two to four hours after meals and is accompanied by heartburn and acid eructations, the following medicine should be taken :—

PRESCRIPTION 30

Bicarbonate of soda	2½ drachms.
Carbonate of bismuth	80 grains.
Carbonate of magnesia	2½ drachms.
Carbonate of ammonia	½ drachm.

Peppermint water to 8 ounces.

An eighth part to be taken 2 hours after meals when occasion arises.

The treatment in such cases should almost always be preceded by a purge. Two grains of blue pill and three grains of colocynth and hyoscyamus pill should be mixed and taken at bedtime, and be followed the next morning by some aperient salts. This is a dose for a strong adult.

In these cases the diet must be much limited. We must leave out all condiments and spices, coffee, alcohol, and acid wines. Soups and meat extracts are bad, and the starchy foods must be taken in a very limited amount. All sugar and sweet foods must be avoided. Meats, eggs, and milk are to be taken but in moderate quantities.

Either of the following is a useful prescription to tone up the stomach and improve the general health :—

PRESCRIPTION 31

Sulphate of quinine	8 grains.
Dilute nitro-hydrochloric acid	80 drops.
Syrup of orange	3 drachms.

Water to 8 ounces.

An eighth part to be taken 3 times a day, 20 minutes before meals

PRESCRIPTION 32

Infusion of rhubarb	4 ounces.
Compound tincture of gentian	½ ounce.
Bicarbonate of soda	80 grains.
Spirits of chloroform	80 drops.

Peppermint water to 8 ounces.

An eighth part to be taken 3 times a day, before meals.

ERUCTATIONS

Eructations, or the return of gas from the stomach, occur in many diseases of the stomach, and particularly when there is indigestion. It is constantly complained of in the dyspepsia of elderly people, and in that which affects the poor. In the former it is the result of want of tone in the muscles of the stomach; in the latter, probably, of the poor quality of the food, which is often of an indigestible character. The gas may originate in several ways: it may be the result of fermentation of the food while in the stomach, either from the food being unsuitable in quality or from delay in its passage from the stomach caused by a weakness of the muscular walls of the organ; it may be caused also by putrefaction of the food. Sometimes gas is brought up in enormous quantity by hysterical or nervous people as the result of excitement. For treatment see Flatulence, p. 102.

WATERBRASH AND HEARTBURN

Pyrosis, or waterbrash, is another of the forms of indigestion. A sharp spasm of pain is felt in the pit of the stomach, and after a few minutes relief is obtained by bringing up a small quantity of watery fluid. This is described as feeling cold in the throat, is quite free from taste or smell, and is probably only the saliva which has been swallowed. There is no serious importance in this symptom, which is not caused by any organic disease, and is more frequent in women than men, and occurs chiefly in the middle-aged. It is most general amongst those who subsist on food of a coarse and indigestible kind. It is common in Scotland, and is ascribed to the large amount of oatmeal that is eaten. We know that Dr. Johnson in his dictionary describes this as "food for horses in England, and for men in Scotland." This was a libel on oatmeal; but it is quite true that the food is difficult to digest, though very nutritious, and is likely to cause waterbrash. Green vegetables also, when they form the chief part of the diet, are likely to produce this trouble.

For treatment it is necessary to avoid the articles just mentioned as exciting causes, and to adopt a mixed diet including
Treatment. meat and other nourishing substances. Lime-water or a few doses of the bismuth mixture (Pr. 29) will do good, or the compound kino powder of the Pharmacopœia in twenty-grain doses three

times a day. This last contains opium, and should therefore only be used if the trouble is severe.

Heartburn is a condition very similar to waterbrash. A hot scalding sensation is felt in the pit of the stomach, which spreads up to the throat. After a time a small amount of fluid is brought up which scalds the gullet, and if it reaches the throat and mouth gives the sensation of burning and sets the teeth on edge. These effects are due to its great acidity, the acid being that of the gastric juice, sometimes mixed with acids produced by decomposition of the food. Heartburn is sometimes a very distressing symptom in the later stages of pregnancy.

To cure heartburn the diet requires attention. All articles which contain much fat, sugar, or starch should be avoided. The use of tobacco

Treatment. must be limited or stopped entirely, and alcoholic drinks must be reduced to a minimum. Curiously, in the heartburn of pregnancy, eating lettuce often gives relief.

Alkaline medicines are required to correct the acidity, such as a couple of soda-mint tabloids, a dose of the bismuth and bicarbonate of soda mixture (Pr. 30), or some Vichy water drunk in sips. Or a mixture of nux vomica and weak nitro-hydrochloric acid may be recommended:—

PRESCRIPTION 33

Tincture of nux vomica	80 drops.
Dilute nitro-hydrochloric acid	80 drops.
Syrup of lemon	2 drachms.
Water to 8 ounces.	

An eighth part to be taken 3 times a day, 10 minutes or so before meals.

HICCOUGH

This is always an annoying complaint, sometimes a most exhausting one, and occasionally really dangerous. Fortunately the dangerous cases are rare, and then the hiccough only appears as one of the complications of a serious disease. It is caused by a sudden contraction of the diaphragm or midriff, the large muscle which separates the chest from the abdomen and is brought into action in respiration.

Causes. Anything that irritates this muscle through the nervous system may bring on an attack. Hot spiced or peppery foods, or even hot drinks, may act in this way, and some people always have an attack if they begin to eat their meals without drinking. There are many other strange causes which are not of much importance in

themselves. It is not unfrequently met with in drunkards. In acute peritonitis from perforation of the stomach or bowels, or after abdominal operations, this trouble is encountered, and is of very grave omen; it exhausts the patient, prevents sleep, and causes constant movement of painful parts.

In the simple form simple remedies will stop it, but in the serious, often nothing will. To stop the involuntary spasms it is necessary to put the muscle on the stretch, and anything that produces a feeling of suffocation will do this, such as trying to count up to a hundred without taking breath, or holding the breath for a minute. A sudden shock has the same effect, and many an attack is cut short by the patient being shouted at suddenly. Swallowing a mouthful of water with the fingers stuffed well into the ears is a certain cure in some persons. In prolonged attacks it might be well to try a much-vaunted remedy, namely, a teaspoonful of mustard dissolved in a tumblerful of hot water, to be taken in sips. In the hiccough of hysterical women musk is the drug recommended, but really it is the hysteria that requires treatment. In that of drunkards a mixture of tincture of nux vomica five drops, and tincture of capsicum five drops, in a tablespoonful of water, every hour for three or four doses, often works wonders.

VOMITING

The act of emptying the stomach of its contents through the gullet is sometimes carried out voluntarily, but more frequently is a reflex action of the nervous system. The act is preceded by a violent inspiration, during which the diaphragm is pressed downwards and fixed; the muscles in the abdominal wall then contract and drive the stomach against it, the muscles which control the opening of the stomach and of the gullet relax, and finally the muscles of the stomach wall contract, and clear it of its contents. If the cardiac opening of the stomach remains closed, "dry retching" occurs. This is a complicated process, but Nature's arrangements, even when complicated, work wonderfully smoothly. So simple is the business that in some cases vomiting cannot be looked upon as a disease. It is produced by the slightest causes in infants and children. In the former it is Nature's safety-valve to relieve an over-filled stomach, for a baby will be sick one moment and happy and smiling the next, apparently experiencing no sensation of nausea. The symptom of nausea, however, usually precedes vomiting, accompanied with a free

flow of saliva, the swallowing of which starts the retching. Almost all diseases of the stomach are complicated with this symptom at some stage—all forms of indigestion, as well as cancer and ulcer of the stomach. The importance of vomiting and its treatment vary according to its cause. It is very often due to diseases which do not come under the list of affections of the stomach at all. It not uncommonly marks the onset of some of the infectious fevers, such as measles and scarlet fever, and may be the first evidence of the approaching illness; it may be the most prominent symptom of Bright's disease of the kidneys, and of such affections of the brain as tumours, abscess, or meningitis. One peculiarity of the vomiting which is caused by brain disease is that the feeling of sickness or nausea may be entirely absent.

"Morning sickness" is met with in two such perfectly distinct conditions as pregnancy and chronic alcoholism; it occurs when the stomach is empty, upon first getting out of bed. But vomiting may not be limited to the morning in these conditions, and is occasionally very distressing and continuous, and produces great prostration. In many people it is induced by certain sights or smells, and it frequently follows painful accidents, especially those which involve the joints, such as strains and sprains. Finally, many poisons, irritants such as mustard, salt, or warm water, and irritation of the throat, are powerful emetics.

The chief distinctive points between the vomiting of brain disease and that of stomach disorder are here given in tabular form:—

BRAIN VOMITING.

1. There is little or no nausea, and the vomiting continues in spite of the stomach having been emptied.
2. There is no tenderness over the stomach, and pressure is borne without inconvenience.
3. The tongue is clean, the breath sweet, and the bowels obstinately confined.
4. Headache comes on early, and is a prominent symptom.
5. The stomach is emptied without effort.
6. There is no disgust for food.

STOMACH VOMITING.

1. The nausea is relieved, at all events temporarily, by the stomach being emptied. It returns directly food is taken.
2. There is tenderness over the stomach, and pressure induces an inclination to retch.
3. The tongue is dirty, the breath offensive, and there are griping pains in the stomach, with diarrhœa.
4. Headache comes on after the other symptoms.
5. The vomiting is preceded by retching.
6. There is complete disgust for food.

To stop vomiting it is necessary to cut off the supply of food, or to take the simplest food, such as milk and soda-water or milk and

lime-water, in small quantities. Small pieces of ice may be sucked, or very hot water taken in sips, and a mustard poultice applied to the pit of the stomach. In the serious forms of vomiting little **Treatment.** can be done, but the diseases which cause it must receive attention. In the simple forms nothing is more useful than an effervescing mixture such as this:—

PRESCRIPTION 34

Bicarbonate of soda	2 drachms.
Tincture of lemon	2 drachms.
Syrup	$\frac{1}{2}$ ounce.
Water to 8 ounces.	

An eighth part to be taken every hour or two, during effervescence with a dessertspoonful of lemon juice.

To each dose of this may be added either dilute hydrocyanic acid 3 drops, or carbonate of bismuth 10 grains, and, if the pain is severe, solution of hydrochlorate of morphia 10 drops.

Vomiting produced by irritating food or poisonous substances is Nature's method of cure; it should not be checked until the stomach is well emptied, but may be encouraged by drinking a large quantity of warm water. This treatment, besides washing out irritating material from the stomach, clears out the thick mucus which generally forms in it. The stomach having been cleared, the effervescing mixture may be started.

Ipecacuanha wine in one-drop doses, or tincture of nux vomica in two-drop doses, or spirits of chloroform in three-drop doses, each with a teaspoonful of water, are useful remedies. Carbonate of bismuth 10 grains, as a powder, washed down with a little water, often checks the sickness; the powders remain on the surface of the stomach and cannot be easily rejected like ordinary fluid medicines. For the vomiting of pregnancy the following is a good prescription:—

PRESCRIPTION 35

Dilute hydrocyanic acid	16 drops.
Bromide of potash	80 grains.
Oxalate of cerium	16 grains.
Tincture of cardamoms	2 drachms.
Chloroform water to 8 ounces.	

An eighth part to be taken 3 times a day, the first dose half an hour before getting up in the morning.

The administration of food requires careful management. At first the stomach should be given complete rest, and no food should be taken ; then milk and soda-water or milk and lime-water may be tried in spoonfuls, or, if these cannot be retained, koumiss or effervescing milk. It is far better for the patient to take a teaspoonful and keep it down, than a tumblerful and vomit it. As the stomach recovers and retains the food, the amounts may be gradually increased, and chicken and other broths may be taken, light milk-foods such as Benger's, arrow-root, milk-puddings, and finally solid food.

VOMITING OF BLOOD

Hæmatemesis, or vomiting of blood, is met with in some general blood diseases, such as acute infectious fevers, or in scurvy, purpura, and persistent jaundice ; in certain diseases of the heart and of the liver, in which the flow of blood from the veins of the stomach is impeded ; and in diseases of the stomach in which there is a broken surface or oozing from the mucous membrane, such as inflammation, congestion, and cancer, and, most important of all, ulcer. When blood is brought up it is important to be sure where it comes from ; it may come from the stomach or from the lungs, and the following table will give the distinguishing points :—

FROM THE STOMACH.

1. The blood is of dark colour.
2. It is vomited.
3. It is often mixed with food, and is not frothy.
4. It is preceded by nausea and symptoms of stomach trouble.
5. It is afterwards passed from the bowels.

FROM THE LUNGS.

1. The blood is of a bright red colour.
2. It is coughed up.
3. It is often mixed with phlegm, and is generally frothy.
4. It is preceded by pain, difficulty of breathing, and symptoms of lung trouble.
5. It does not occur in the motions.

In bleeding from the nose, from the throat, or from the gums, the blood may gradually run down the gullet or be swallowed, and, after a good deal has collected in the stomach, be returned by vomiting. To prove that this bleeding does not depend on disease of the stomach we must find the sore place in mouth, nose, or throat, or by sitting the patient up the blood may run forwards from the nose or mouth, and thus show from whence it comes.

Bleeding into the stomach may occur very gradually as in congestion of that organ, or it may come on with a sudden rush as when an ulcer

eats into an artery. In the former case it is vomited as a dirty brownish or black fluid which is like coffee-grounds, the blood having been altered by the gastric juice, and is often mixed with portions of food ; in the latter it has a bright red colour like fresh blood.

The treatment for this complaint is hardly suitable for unskilled persons, and it is wisest to send for a doctor ; in the meantime lay the patient flat on a bed or sofa with the head slightly raised, undo all tight clothing, keep him perfectly quiet from all exertion of talking or moving, open the window, and keep him cool. **Treatment.** Nothing must be given by the stomach, not even brandy ; if there is faintness, use smelling salts, or even an injection of brandy into the bowel—a tablespoonful with half a tumblerful of warm water. Get some ice, break it into small pieces, and let them be slowly sucked and swallowed.

ACIDITY

Acidity is a term applied to two distinct conditions which, although they may occur at the same time, have no connection with one another.

The first is what we may call *local* acidity, and is simply due to an excessive amount of the normal acid of the gastric juice, or “acidity of the stomach.” It is the condition we have already described under the name of heartburn, which is its most marked symptom.

The other form of acidity may be called *general*, as it affects the whole body. Acid is constantly being formed in the body by the disintegration and oxidation of the tissues of the body and of the food. These acids, on the other hand, are as constantly being carried off from the body by the lungs, skin, and kidneys, which are the three chief excretory organs of the body. Now, if from any cause the amount of acid formed is increased, or the amount of acid carried off is diminished, this material collects in the body and acts as a poison. The acids which are of chief importance in this connection are lactic acid, oxalic acid, and uric acid. The principal causes of their accumulation in the system are want of healthy exercise and functional derangements of the liver, all of which act by lessening the amount carried off from the body. Eating to excess, especially of animal foods, is the most patent means of increasing the formation of acid. These acids must be looked upon as one stage through which most of the waste material of the body has to pass, and its accumulation in the body renders it prone to attacks of disease of many sorts. Persons in this condition are very liable to catarrh of the mucous

membranes, especially those of the bronchial tubes, digestive organs, and kidneys ; they catch cold upon the slightest exposure, and are liable to gouty attacks, rheumatism, eczema, and nettlerash.

How, then, should this condition be avoided ? By indulging in abundance of healthy exercise and less animal food. Exercise increases

Treatment. all the nutritive changes in the body, makes the circulation of the blood more active and the respiration more rapid, encourages the entrance of oxygen into the body, and stimulates the perspiration and the excretion of the kidneys. The diet in such cases should be just as much as is required to keep the body in health, and stop short of self-indulgence ; it should consist chiefly of fish, fowl, game, and eggs, and should exclude much of the sugary and starchy food and butcher's meat. The waste products should be assisted also in their exit from the body by careful but not excessive purging with alkaline waters and salts, such as Apenta, Hunyadi, or Carlsbad. A visit to some mineral spa is an excellent prescription, for exercise would be indulged in, food diminished, fluids taken in large quantities, and the bowels regulated.

DEFECTIVE APPETITE

The appetite is much affected by disease. Anorexia, which is the technical term for loss of appetite, occurs in most stomach complaints : in acute gastritis there is often a complete loathing for food ; in chronic gastritis, simply want of desire ; whilst in gastric ulcer there may be appetite, but a dread of pain prevents the patient taking nourishment. Congestion and sluggishness of the liver also cause great loss of appetite, and it is in these cases that a dose of blue pill at night and of salts in the morning will often act like a charm.

When the body is healthy and the stomach in good working order the appetite returns at the usual meal-hours, but often passes off again if eating is long deferred. The want felt by the body at large produces the natural appetite, and Nature's guide can to a great extent be followed as to the amount of food that should be taken. Appetite should be satisfied, but care should be taken not to over-satisfy it ; it would doubtless be always wisest for those who are gouty, or who are getting on in age, or who are living sedentary lives, not to quite satisfy their appetite. The fashion of men about town is to stimulate their appetites artificially by taking some sherry and bitters before their meals, and this is a scientifically correct method of whipping up a jaded appetite. The

various bitters are vegetable products, calumba, cinchona, cascarilla, and orange being some of the most important. They stimulate the stomach, and thus produce appetite, and are rendered more active by the addition of alcohol. Angostura bitters were at one time much used for this purpose, and are still very useful if obtained pure, but in 1804 a quantity of bark of a highly poisonous nature reached Europe, and, being mistaken for angostura bark, gave rise to cases of poisoning, and in consequence the use of angostura bark was prohibited in some countries. The spurious bark is obtained from the *Strychnos nux vomica*, from which strychnia is obtained, and this explains the source of the poison. Occasionally people sit down to their meals with a tremendous appetite, but after a few mouthfuls it seems satisfied and they are unable to eat any more. This is because the stomach is in an irritable condition, and the food produces over-stimulation of it, and thus leads to loss of appetite. In this case bitters and alcohol, which, as we have said, are stimulants, are no good, but only make matters worse. The stomach requires soothing, and a mixture containing bismuth and hydrocyanic acid (Pr. 25) is the correct treatment.

EXCESSIVE APPETITE

Occasionally occurs in such an extreme form that it almost amounts to a disease. In a mild form it occurs after all acute feverish illnesses during convalescence, from the great waste of the body caused by the fever and the inaction of the stomach; at such times it is natural, but it must be satisfied with prudence. In diabetes, in which an enormous amount of sugar passing away exhausts the body, there is an abnormally large appetite, which has unfortunately to be kept under control. A story is told (by Pryer) of a lady, aged thirty-two, who, after great worry and trouble, was attacked with intense hunger. She at once drank three pints of milk, but the hunger growing worse, and fearing she was going to die, she took within an hour three more pints of milk, twenty-three eggs, and two pints of wine. At last she fell asleep exhausted. In the morning she was quite well, and never had another attack.

In chronic gastritis the great craving for food may be checked by a dose of fifteen grains of bicarbonate of soda half an hour before the craving is expected. In children a craving for food is frequently a symptom of worms.



THE SUPERFICIAL LYMPHATIC GLANDS AND VESSELS.

CHAPTER V

DISORDERS OF THE BOWELS

Appearance of the Motions—Inflammation of the Bowels—Appendicitis—Ulceration of the Bowels—Flatulence—Intestinal Obstruction—Constipation—Colic—Diarrhœa.

APPEARANCE OF THE MOTIONS

MUCH may be learnt in diseases of the digestive organs by an examination of the motions. The normal colour, shape, and consistency must be recognised, and any deviation from this requires an explanation.

The normal amount varies much, and is chiefly dependent upon the quantity of food taken; it is always greater with a vegetable than with an animal diet. Hard, lumpy, offensive motions indicate constipation. Unusually large and infrequent stools point to mischief high up in the digestive organs, while scanty frequent motions show affection low down, probably in the colon. A large amount of slime or mucus, which has the appearance of jelly, points to catarrh of the large bowel. Occasionally the stools are much diminished in size, "pipe-stem or pencil" motions, and this shows the existence of some contraction of the bowel or stricture; with piles also there is often an indentation or alteration in shape.

The next point to observe is the colour, the normal being a dark brown, which is produced by the pigment of the bile, and is originally derived from the blood. The colour varies much in health; it is darker with an exclusively meat diet, and when the motion has been long retained in the bowel; it is pale yellow when milk only is being taken, whether in adults or infants. Green vegetables, as spinach, and coffee, claret, and porter give their respective tints. "Clay-coloured" or "putty-like" motions are characteristic of absence of bile, and are usually accompanied with high-coloured urine.

When blood is passed with the motions its appearance varies according to the part of the digestive tract from which it is derived. If the

blood is bright and appears only on the surface of the motion it is almost certainly derived from quite the lowest portion of the bowel, and shows either the presence of piles or of ulceration of the rectum, and in the latter case it is probably mixed with mucus. If, however, the blood comes from high up—the stomach or small intestines—it is intimately mixed with the motion, and gives it a blackish, sooty, or even tarry appearance, the blood having been altered by the action of the digestive juices and by the intestinal gases. Two drugs give a somewhat similar appearance to blood, and are liable to cause alarm by being mistaken for it; these are bismuth and iron, but the colour produced by the former is more olive green or grey than black. Blood in the motions must never be overlooked, as it indicates, when present in any quantity, a very serious condition of things. Its recognition may also be the means of discovering disease in an early stage, when treatment can be applied with special efficacy. The condition has received the name of *melæna* or black blood, and may, of course, occur in all those affections which produce hæmorrhage into the alimentary canal, from the stomach to the colon; the most important are ulceration, cancer, typhoid fever, and dysentery, and also the much less serious complaint of nose bleeding, in which the blood is swallowed.

Indigestion may be discovered by finding in the stools not only indigestible articles, as grape pips, cherry stones, and fish bones, but undigested food, as curds of milk (very common in infants), fragments of meat, and globules of fat. When fat occurs in large quantities it is of serious import, and is believed by many to indicate a severe disease of the pancreas.

Lastly, there are certain peculiarities of the motions which are characteristic of the disease in which they occur. Thus in cholera they are like “rice-water,” entirely free from the colouring matter of the bile, and are voided in enormous quantity. In dysentery they are frequent, evil-smelling, and mixed with slime and blood. In typhoid fever they are likened to “pea soup,” are fluid, of a pale yellow colour, very offensive, and sometimes contain blood. When fermentation is taking place in the large bowel they are frothy from the admixture of bubbles of gas.

The microscope can divulge many more secrets; by its use, and by making “cultures,” the germs of typhoid fever, cholera, dysentery, and tuberculosis can be discovered. But these, of course, are beyond the scope of unskilled examination.

INFLAMMATION OF THE BOWELS

Enteritis, or inflammation of the bowels, is a general term for inflammation of the intestines, whether large or small. When the disease involves the small intestine it is often called "summer diarrhœa," or "English cholera," or "choleraic diarrhœa," whilst if the mucous membrane is chiefly involved it is styled "catarrhal enteritis." When the colon or large intestine is affected it is called "colitis," and different names are given to inflammation of its various parts. If the cæcum or first portion of the colon is involved, it is called typhlitis; if the vermiform appendix, appendicitis (p. 100); if the rectum or terminal portion, proctitis.

The causes of enteritis are similar to those which produce gastritis—all sorts of irritating and indigestible food, irritant drugs, and poisons.

Causes. Probably the majority of cases occurring in the summer

are brought on by food which has begun to decompose, or by unripe fruit. Weather has a great influence on the disease, for rapid changes of temperature, warm days followed by sudden cold, or dry weather succeeded by wet, are frequently followed by almost an epidemic form of enteritis; such attacks are, however, always most prevalent in the summer. Wounds or injuries of the bowels always give rise to inflammation—when, for instance, a portion of bowel is nipped in a rupture and becomes "strangulated," or an obstruction develops, or the contents accumulate in excessive quantity; but these conditions usually set up localised inflammation. The bowels are frequently implicated in inflammations of other parts by direct extension of the disease, or they may be inflamed as part of some acute feverish affection, such as diphtheria or scarlet fever.

The symptoms vary according to the severity of the attack. In the milder form there is slight fever with thirst and quickened pulse, but in the

Symptoms. severe forms the temperature rises rapidly, and may reach

as high as 104°, or even higher, and the patient becomes prostrate and extremely ill. The majority of cases take a middle course. The appetite fails, the tongue gets furred, the head aches, and there is usually a good deal of pain and tenderness all over the abdomen, especially about the navel. Diarrhœa occurs in most cases, but in very severe attacks the bowel becomes paralysed, and constipation is produced. When the upper part of the small intestine is inflamed, the

swelling of the mucous membrane is likely to spread up the liver ducts and block the flow of bile, which becomes absorbed into the blood, and produces jaundice. This symptom may cause much alarm, but is not serious, and will gradually subside with the other symptoms as the swelling of the lining membrane disappears. When the lower bowel is most affected diarrhœa is very troublesome, the motions are frequent, watery, and mixed with much mucus, and even blood ; there is also much straining at stool, and constant desire to pass water.

In most attacks of enteritis a few days' rest and treatment sees the patient well again ; but if neglected, or if it affects persons already in ill health, it is likely to pass into a chronic condition, which is very difficult to cure. Severe attacks cause much anxiety, especially when they occur in young children, among whom it is one of the most fatal diseases ; but this disastrous termination can be averted in most cases if ordinary care is taken.

Treatment should be begun as soon as symptoms show themselves. The patient should go to bed and keep quiet and warm. The diet must be as simple and unirritating as possible, and should be given in frequent and small quantities. Nothing is better than milk, which may be diluted with an equal quantity of soda-water or a third of lime-water ; thirst may be relieved by sucking pieces of ice, by barley-water, and toast and water ; everything taken should be tepid or cold, for hot drinks increase the trouble. If milk disagrees, chicken or mutton broth or weak beef tea and meat essences may be tried. As things improve, milky farinaceous foods may be used, arrow-root, cornflour, tapioca, sago, and bread and milk, and ordinary food may be gradually returned to as the symptoms subside.

Medicinal treatment is of great value. The first question that arises is whether to give an aperient or not. If the attack has been definitely brought on by some unsuitable food, we *should* do so. The best purge for an adult would be a powder or tabloid of two grains of calomel, followed in three or four hours by some Carlsbad salts or Apenta water. If the large bowel is chiefly involved (a condition recognised by the absence of vomiting, by a clear tongue, by mucus in the stools, by straining at stool and trouble in passing water), enemata of soap and water should be used instead of aperients, not less than a pint being administered, and they should be repeated every day, or even oftener, if there is constipation. One caution is necessary : if there is much fever with tenderness

of the abdomen, or if there is a rupture which cannot be replaced, all aperients must be avoided, and only enemata used; in these cases skilled advice ought to be obtained at once to decide whether a strangulated hernia or appendicitis is present.

Either of the following medicines may be taken, both being equally good :—

PREScription 36

Solution of bismuth	.	.	.	.	.	½ ounce.
Citrate of potash	.	.	.	.	.	2½ drachms.
Bicarbonate of soda	.	.	.	.	.	2 drachms.
Tincture of lemon	.	.	.	.	.	2 drachms.
Chloroform water to 8 ounces.						

An eighth part to be taken every 4 hours with a powder of citric acid, 10 grains.

PREScription 37

Carbonate of bismuth	.	.	.	.	.	80 grains.
Dilute hydrocyanic acid	.	.	.	.	.	24 drops.
Bicarbonate of soda	.	.	.	.	.	2 drachms.
Mucilage of gum	.	.	.	.	.	½ ounce.
Water to 8 ounces.						

An eighth part to be taken every 4 hours with a dessertspoonful of lemon-juice.

When there is much pain, tincture of opium (laudanum), 10 drops, may be added to each dose. Also moist and hot applications should be applied to the abdomen, either in poultices or fomentations. When the attack has been evidently brought on by exposure to cold, perspiration should be encouraged; 10 grains of Dover's powder will cause this and ease the pain at the same time.

As the symptoms pass off it will be necessary to improve the diet, and take a vegetable tonic with bismuth and an acid mixture, as in the following prescriptions, a bottle of the former followed by one of the latter :—

PREScription 38

Tincture of nux vomica	.	.	.	.	.	80 drops.
Carbonate of bismuth	.	.	.	.	.	80 grains.
Mucilage of gum	.	.	.	.	.	½ ounce.
Syrup of orange	.	.	.	.	.	½ ounce.
Water to 8 ounces.						

An eighth part to be taken 3 times a day before food.

PRESCRIPTION 39

Dilute hydrochloric acid	.	.	.	.	80 drops.
Tincture of nux vomica	.	.	.	.	80 drops.
Tincture of lemon	.	.	.	.	2 drachms.
Syrup	.	.	.	.	$\frac{1}{2}$ ounce.
Water to 8 ounces.					

An eighth part to be taken 3 times a day after food.

After one attack of enteritis there is great liability to recurrences, and the patient has to be most careful to avoid the recognised causes. The diet must be arranged with the greatest care, and nothing that is indigestible or unsuitable taken. All risk of cold must be guarded against, warm clothing must be worn, a flannel belt assumed to protect the abdomen, and ordinary hygienic rules of exercise, etc., observed.

APPENDICITIS

Inflammation of the vermiform appendix (Fig. 6, p. 55) has apparently become more common than it used to be, which may be explained to some extent by the following considerations. Inflammation in this situation always existed, and was recognised, but the important part played by the appendix in the disease was not fully understood until the matter was elucidated by Sir Frederick Treves. Until then the complaint had always gone by the name of typhlitis, or inflammation of the cæcum, the part of the large bowel to which the appendix is attached. Even now many cases of so-called appendicitis would be far better described as typhlitis, as the cæcum is more affected than the appendix itself, which in many cases is found quite healthy.

Appendicitis may be due to the presence of hardened portions of motion, or of foreign bodies such as seeds, cherry stones, bristles, pins, worms, or gall stones; it may be caused also by injuries—blows or strains; but a very large number of cases owe their origin to irritation of the large bowel, by indigestible food or by constipation. This irritation produces catarrh of the mucous membrane of the bowel, and the catarrh spreads into the appendix, the cavity of which is continuous with that of the intestine. Now there is little doubt that influenza has become much more common of recent years, and its increased frequency has been concurrent with that of appendicitis. As influenza has the habit of attacking the bowels in many cases, and setting up catarrh, we can easily understand that there may be a distinct relation between

the two diseases, and that the increased frequency of attacks of influenza may be one of the explanations of the increased frequency of appendicitis. It has been suggested, too, that the more extensive use of boracic acid as a food preservative may be one of the factors in the case, this substance causing irritation of the intestines with stomach-ache and diarrhœa.

The symptoms of appendicitis are similar in many cases to those described under enteritis, especially in what may be called acute attacks.

Symptoms. There are vomiting, fever, furred tongue, and pain in the abdomen; the pain may be all over the abdomen at first, but as it gradually subsides there remains trouble in the right side low down towards the groin. Here it is tender to pressure, and often a lump or swelling may be felt. The lump is due to inflammation, and it may gradually soften and develop into an abscess.

Fortunately the majority of cases of appendicitis subside gradually, the fever and other symptoms abate, and lastly the local tenderness and lump disappear. But in those cases where matter is forming the pain and tenderness in the right side continue unrelieved, or rather grow worse, and—a very important sign—the temperature remains raised, perhaps to 100° or 101° , whilst the swelling grows larger. When matter forms, it may break outwards through the skin, or inwards, either into the bowel or into the peritoneum. If into the peritoneum, the condition is one of the greatest danger.

The patient must go to bed at once, and keep there, as still as possible; any movements are bad, but especially those of the right leg, which more definitely affect the inflamed part. This leg should

Treatment. be kept slightly bent, with a pillow under the knee, whilst the patient lies on the flat of his back. No aperient medicine of any sort should be taken (not even the supposedly innocuous castor oil) for the first few days, the bowels must be emptied by soap and water or glycerine or olive oil enemata. The diet must be slops, milk and soda, or meat broths, in small quantities. The bismuth mixture (Pr. 36 or 37) ordered for enteritis should be given with ten drops of laudanum to each dose, but the latter must be discontinued when the pain is relieved. Externally nothing is better than hot fomentations or thin linseed poultices, which should be applied all over the painful part, after the belladonna extract and glycerine liniment (Pr. 1, p. 14) has been gently smeared on.

Unfortunately one attack of appendicitis is usually only the prelude to others, which may occur at decreasing intervals, and each time the patient runs the danger of abscess, and all its serious complications. Undoubtedly after one perfectly definite attack most surgeons would say that it is right to have the appendix removed, and avoid the dangers of the future. The most suitable time to choose for operation is about three weeks after all symptoms of an attack have subsided. The operation in the quiescent period is not accompanied by great danger, and is a perfectly curative measure. The appendix being removed, no further attacks of appendicitis can occur.

If an abscess forms, a surgeon should open it as soon as possible; nothing can be gained by delay, but, on the contrary, great danger is incurred. Usually the appendix is not removed when the abscess is opened, for fear of producing general peritonitis; the removal of the appendix is reserved for another operation, when the inflammation has subsided and everything is favourable.

ULCERATION OF THE BOWELS

Is not a disease in itself, but a symptom of many different conditions. It may follow an attack of inflammation of the bowels, and is then found in any part of the intestine. Ulcers are not infrequent in the first part of the small intestine called the duodenum. They are very similar in their characters and symptoms to ulcer of the stomach (p. 71), and may very easily be confused with them. The pain of these ulcers comes on at a longer interval after taking food than in the case of gastric ulcer; and, curiously, they are much more common in men than in women, gastric ulcer being quite the reverse. When a large surface of the skin has been destroyed by burns or scalds, ulcers in the bowels are likely to form, a phenomenon not easily explained.

Dysentery is accompanied by ulceration of the intestine, the part affected being the colon. Tubercular disease of the bowel and typhoid fever are other forms of ulceration. Further particulars will be found under the respective headings.

FLATULENCE

Wind in the stomach and intestines is a very disagreeable affection. In itself it is not in any way dangerous, but it causes much discomfort, and in some cases great pain. It is a symptom of most forms of

indigestion. The gas or wind is formed in the stomach and intestines by fermentation or putrefaction of the food, and is most likely to occur when the food for some reason or other is delayed in its progress along the alimentary canal.

The persons most liable to flatulence are those who are debilitated or elderly, for in these the muscular tone is lost ; the poor and ill-fed are its victims also from the unsatisfactory nature of their food, for warm fluids such as tea and weak soups, mixed with badly cooked vegetables, are exceedingly likely to ferment. The poor ill-fed old woman who makes her dinner off tea and scraps of food may well be affected by “windy spasms,” as she calls them. Women are particularly liable to wind, and the very remarkable cases of the affection in which gas in enormous quantities is brought up are met with in hysterical women. The gas which is “belched up” is certainly more than could be produced from fermentation of food. By some it is supposed to be given off by the blood in the walls of the stomach, in other cases it is undoubtedly swallowed and brought up again unchanged. The swallowing of air is not by any means so difficult a matter as it might seem. A certain amount is always swallowed with the food, and the habit of swallowing it in large quantities is easily acquired. An attack of flatulence very commonly follows irregularity of meals in some persons, or it may result from constipation or from sluggishness of the liver.

When the intestines are chiefly affected, the disease goes by the name of *tympanites* (from tympanum, a drum), and is well named, for the abdomen gets quite as tight and as resonant as a drum. Gas in the abdomen can be distinguished from water by this means: if, when the abdomen is tapped (percussion), it is resonant, gas is present ; if there is a dull sound, the contents are fluid or solid. In severe tympanites the abdomen is so distended that pressure is exerted on the surrounding parts, especially the heart and lungs, and such serious symptoms as palpitation, irregular pulse with faintness and giddiness, may be brought on.

Much can be done by treatment to give relief. Large draughts of hot water or of spirits and water are useful, and any of the following drugs may be tried, viz. sal volatile, thirty or forty drops ; or spirits of chloroform, twenty drops ; or spirits of ether, thirty drops ; in half a wineglassful of water. Aromatic drugs are of value, as they disperse the wind and help to bring it up. Twenty drops of tincture of ginger in water is an old-fashioned remedy, and gives an agreeable feeling

Treatment.

of warmth to the stomach, a similar effect being obtained from peppermint-water, the dose of which is one or two tablespoonfuls. The oils of cloves, cajeput, caraway, anise, in three-drop doses on sugar or a piece of crumb of bread, often give great relief. When there is acidity as well as flatulence, the combination of peppermint and soda in the soda-mint tabloids is indicated; two tabloids may be taken and two more in an hour if necessary. As a preventive, five grains of extract of rhubarb with one grain of cayenne pepper may be taken, immediately before food. Charcoal has a great power of absorbing gases, and has been much used for flatulence. A teaspoonful of the freshly prepared powder of wood charcoal can be taken, or charcoal biscuits (Bragg's biscuits), or lozenges—these are particularly useful when the gas which eructates is offensive; and creasote, one or two drops in capsules, is also efficacious. If the wind distends the bowels more than the stomach, especially when the large bowel is affected, much comfort is obtained, and the wind helped onwards in its natural direction, by carefully applied massage and rubbing of the abdomen. This must be in the direction of the colon, upwards on the right side, across the abdomen, and downwards on the left side (see Fig. 6). Wind in the colon is relieved by enemata into the bowel, a pint of warm water with a teaspoonful of spirits of turpentine or ten drops of oil of rue. An aperient is generally required when flatulence continues to give trouble, two grains of calomel in tabloid form, or five grains of compound asafœtida pill, followed in a few hours by a dose of salts.

The pain being relieved, means must be taken to prevent its return. The diet must be reviewed, and anything calculated to cause trouble must be omitted. The most likely articles are starch, sugar, fruits, green vegetables, and warm drinks, especially tea and soup. Toast should be taken instead of bread, liquids in small quantities with meals, but freely on an empty stomach, and indigestion removed by appropriate measures. The digestion will be improved by the prescriptions recommended as digestive tonics in the section on Indigestion (p. 85).

INTESTINAL OBSTRUCTION

Is fortunately not a very common complaint, but in all its forms it is very alarming. The name is applied to a great variety of conditions, in all of which the prominent and serious symptom is the obstruction or blocking of the contents of the bowels in their onward passage.

It occurs in two chief forms—acute and chronic. The former comes on suddenly, with severe symptoms, and soon places the patient in extreme danger, and if not quickly relieved ends rapidly in death; the obstruction in these cases is usually in the small intestine. The second or chronic form is more gradual in its onset; the symptoms, slight at first, continue to grow worse daily, the patient slowly becomes more and more ill, and if relief is not obtained will die, as surely, but not so rapidly, as in the acute forms. In these cases the obstruction is more likely to be in the large intestine. All forms of intestinal obstruction require great experience to discover the cause, and the most skilled knowledge to overcome it when discovered; it is therefore a disease quite unsuited to home treatment. It is, however, necessary to describe its causes and symptoms, so that anxieties may be aroused and that sufferers may be able to recognise the symptoms which indicate danger, and at once obtain the very best assistance within reach. This disease is one in which delay is always dangerous, and would in many cases be fatal.

The causes of obstruction may be briefly stated, and can be divided into three classes. (1) It may be caused by the contents of the bowel, either by the natural contents becoming hard and dry
Causes. as in extreme constipation, or by foreign bodies such as collections of hair, masses of indigestible food, or large gall-stones. (2) It may be due to disease of the walls of the bowel, as cancer or contraction of scars. (3) It may be produced by pressure from without, the result of a tumour or inflammatory band.

In this last category must be included twists of the bowel on itself and the formation of a kink called “volvulus,” the invagination of a portion of the bowel into itself called “intussusception,” and the nipping of a rupture by surrounding parts producing strangulation.

The symptoms by which the presence of obstruction can be recognised are severe pains in the stomach, uncontrollable vomiting, and absolute constipation. When these three symptoms occur together
Symptoms. obstruction is present, but we must consider each of these separately a little more in detail.

Pain is one of the earliest symptoms, and although it may vary in severity, it continues throughout the case, and usually persists to very nearly the end. In acute obstruction the pain comes on suddenly, is indescribable, and “doubles the patient up.” In chronic obstruction

it comes on more gradually, but as the belly gets distended becomes worse, and is ultimately very severe.

Vomiting is practically always present in acute obstruction from the very beginning; in chronic cases only in the later stages; but in both it is most distressing, and is quite uncontrollable. After the stomach has emptied itself, bile comes up, followed by a yellow, offensive-smelling fluid, the regurgitated contents of the small intestine. The appearance of this material is an absolute proof of obstruction.

Constipation is a most prominent symptom in acute obstruction. It occurs at once from the time of the block, and no further passage of the bowel contents can occur, and no action of the bowels except in discharging the material which had passed the seat of obstruction before the occlusion.

In chronic obstruction the final blockage may have been preceded by several attacks of obstinate constipation which have given way to active treatment. But the belly grows more and more distended with wind, the movements of the coils of the bowel can be seen and heard and felt, but all their efforts to force on their contents through the obstruction are fruitless. The patient is now very ill, all his thoughts are directed to the idea of getting his bowels to act. His strength, however, soon becomes exhausted, and he sinks finally into unconsciousness, although almost up to the end his mind is unaffected and clear.

What treatment, now, is suitable for such a case? Aperients have probably been tried and failed, but if not, our first and strongest advice
Treatment. is to give no purgative drugs whatever. Put the patient to bed, give the very smallest amount of nourishment possible, and if none can be retained in the stomach, give nutrient injections. Send for the doctor at once if one is within reach. If a doctor can be obtained, give no opium, but if skilled help is impossible, the pain must be relieved by opium pills (one grain), at intervals of three or four hours, as may be necessary to keep the patient quiet. Apply hot fomentations or poultices to the abdomen, and gentle rubbing if it can be borne. Large injections of soap and water, or of warm olive oil into the bowel, sometimes are useful by clearing away a block, and emptying the bowel of retained motion.

But undoubtedly the great hope for a patient suffering from an obstruction is that a surgeon may be within reach, who will relieve the obstruction by operation. Surgery has now within its domain diseases

which a few years ago would have been hopeless. Tumours can be removed, portions of the bowel taken away and artificial openings made, with wonderfully successful results, so that even cases apparently the most hopeless may recover.

CONSTIPATION

Irregular and insufficient action of the bowels is one of the most annoying complaints that flesh is heir to. Almost everyone at some time or other has been troubled by it, and to many the action of the bowels is a daily worry, and for months or years may be the cause of constant trouble. This must be looked upon as one of the effects of civilisation. The savage who stuffs his stomach with nuts and fruits, uncooked vegetables, raw meat, and all sorts of other indigestible things, does not suffer from constipation. All this material contains much that cannot be used as food, and that stimulates the bowels by its irritating presence to empty themselves. One of the chief causes of constipation is that civilised man takes his food so refined and so well prepared, that almost all its

Causes. irritating and bowel-stimulating properties are lost. By a good cook all the hard things are softened, and all the indigestible parts are carefully taken away, and there is nothing left to stir up the bowel and aid its action. Again, civilisation supplies us with the beautifully white and finely ground flour from which all the outer husks or indigestible part have been removed, and nothing is left but the starch powder. We get fine white bread certainly, but with it we are likely to get constipation. Pure starch is well recognised as "binding," and pure wheat flour, arrowroot, and cornflour are all bad foods when taken in any quantity, for that reason. In this country there are many people who live almost entirely on animal food, white bread and potatoes, other articles being taken in insignificant quantity or being conspicuous by their absence; the natural result is constipation.

But other civilised habits are just as injurious, and one of the worst in this respect is the want of exercise which is characteristic of so many of us. The City man who rushes off immediately after his breakfast and only just gets home in time for his dinner, with perhaps an hour's interval for lunch, has no time for exercise, neither has the busy man who spends his day in his study engaged in writing or with his books. The Society lady who gets up late, pays visits in her

carriage, dines out, and only reaches home to go to bed, has no time, and still less inclination, for exercise. Sedentary life is a product of civilisation, and is one of the most fruitful causes of constipation. Curiously, in some cases the very opposite condition produces this complaint, for excessive muscular activity may be followed by constipation.

Many persons treat the matter of a daily action of the bowels in the most perfunctory manner. If Nature's call is irresistible, they attend to it; but apparently the thing is a bore, and to be avoided when, and as often as, possible. The function is performed in a hurry, and if any difficulty arises in its performance, it is left unfulfilled. It is not easy to understand how people can behave in this way about a matter which so intimately concerns the individual health, unless it be due to ignorance of Nature's laws and of the results of setting them at defiance.

! It is, of course, impossible to lay down an absolute law as to the frequency with which the bowels should act, so much depending on individual peculiarities. Many persons always get two or even three actions a day, whilst others remain quite well with one every other day, or twice a week, perhaps even once a week; but there is no doubt that the vast majority require a daily evacuation, and although good health is quite consistent with wide departures from this rule, yet we must take it that the habit that all should cultivate is a daily action of the bowels.

Some people suffer from a natural, or even an inherited, tendency to this complaint; and it is only by constant attention to hygiene, diet, and usually with the help of drugs, that they can keep themselves in any way comfortable. But the majority of cases of chronic constipation are originally due to carelessness or indifference, by which bad habits have been started that are almost impossible to overcome without pills and draughts, and all sorts of concoctions from the chemist's shop.

Temporary attacks are commonly brought on by an enforced neglect. A man has to hurry off to his work, or a train has to be caught, and there is no time for the usual visit. No particular discomfort may be felt, but the contents of the large intestine are retained, and become drier and harder than usual, and perhaps require an aperient to remove them. Such occurrences when repeated may accustom the bowels to being loaded and after a time they become so blunted and insensitive that nothing but a really rousing dose of purgative is of any use.

Another fruitful cause of constipation is the habit of taking strong purgatives. Some individuals are never content unless they are taking

blue pills, calomel, patent pills by the half-dozen, or large doses of salts ; these large purgative doses will have the desired effect, and clear out the bowels in real earnest, but they also get the intestines so accustomed to violent stimulation that they cease to act by Nature's gentle stirrings, and refuse altogether to do so with mild medicines. Abuse of purgatives is a most dangerous habit, and sure in the long run to bring about just what it was intended to prevent.

Slight and passing attacks may produce no ill effects beyond a little discomfort, but in many people even the omission of one action gives

Symptoms. them uncomfortable sensations of weight and distension in the stomach ; the head, too, feels heavy, they cannot work well, nor think clearly, and they tire unusually quickly. But many symptoms follow in the train of habitual constipation. Dark patches form under the eyes, and in course of time there develops an aching, beating, throbbing pain in the forehead and temples, or over one eye, with swimming and giddiness in the head. Along with headache we often meet with irritability of temper and restlessness. The sufferer finds it impossible to settle to his occupations and fix his attention. Very often such people become drowsy and heavy, they grow tired and worn out, go to bed and fall asleep soundly and at once ; but their sleep is unsatisfactory, they awake still heavy and unrefreshed, with furred tongues and an unpleasant taste in the mouth. All such symptoms are cleared away by a good purge and careful regulation of the bowels afterwards. Sleeplessness is another condition which is not unfrequently consequent upon constipation. The discomfort felt in the abdomen is sufficient to make comfortable sleep impossible, and the best sleeping-draught in such cases is a dose of salts.

The injurious effects of constipation are due to the retention of waste materials in the body for long periods. These waste products are not only useless, but absolutely injurious, and by their retention in the bowel may injure the general health most materially. We all know what a general dread is felt of sewer gas, and if we take a new house how we always make inquiries as to whether the drains are all in order ; and yet in constipation we have, as it were, an uncleansed drain in our very bodies, choked with poisonous material which can be easily taken up into the system and produce the most dangerous complaints. Many persons who feel weak and low, to whom nothing in life seems of any interest, but who feel utterly miserable, would be perfectly well and happy if their

bowels were well cleared. Undoubtedly, with ordinary care nothing but a merely accidental and passing constipation need ever cause trouble.

Without much difficulty, when people are in good health they can guard against constipation altogether by attending to simple rules of hygiene and dietary. They must arrange for a few minutes' **Precautions.** leisure every day after breakfast, and be sure they obtain a daily evacuation. They must not hurry the duty, and if they fail one day they must try again the next day at the same time. After meals is certainly the right time, for when food is taken into the stomach it acts as a stimulus, not only to the stomach itself, but to the intestines; and after breakfast is the right meal, as it is usually the most convenient for a little leisure, and the large bowel has probably become filled during the night, and is therefore ready for evacuation. There is no doubt that a pipe after breakfast is a great help. The active principle of tobacco, nicotine, is a powerful stimulant to the intestines, and helps to cause a regular action. A pipe and the daily newspaper must be looked upon as valuable allies.

Treatment of constipation by food is infinitely to be preferred to that by medicines. It is well to give up white bread or take it in smaller quantities, and use instead brown bread, or wholemeal **Treatment.** bread, digestive biscuits, bread or cakes in which plenty of bran has been incorporated. Oatmeal porridge at breakfast is excellent, especially when taken with brown sugar or treacle; the latter or golden syrup is a first rate laxative, and for this reason we can recommend gingerbread as a useful food. Vegetables (with the exception of potatoes), especially the green vegetables, are very good, and should form an important part of everyone's food. Fruits are even better than vegetables as laxatives. Figs, prunes, apples, tomatoes (raw or cooked), all act in this way; marmalade, jams (particularly home made), and honey, are good, if sweets are not contraindicated. Olive oil, which can be taken with salad, and oily and fatty substances, are beneficial. Many people suffer from constipation apparently because, from habit or otherwise, they have reduced their drink to an unreasonable extent. Without fluid the contents of the bowel must become hard and dry; at least two and a half pints of fluid ought to be drunk in the twenty-four hours, and many cases of chronic constipation have been cured by the very simple remedy of

drinking more water. An extra glassful of water, either hot or cold, taken whilst getting up in the morning, and again at bedtime, may work like a charm—all should try it at any rate, for nothing can be simpler.

Constipation is due to deficient secretion of fluids in the bowels, or to imperfect muscular action of their walls, and if the foregoing simple measures are not sufficient to correct the error, drugs must be resorted to.

Drugs must be looked upon as evils when used for constipation, even though in chronic cases they may be necessary evils. The simpler and weaker the drug the better, if it will accomplish what is required. Although a single dose of a purgative will overcome a temporary and, as it were, accidental attack of constipation, it will have no effect in curing habitual constipation. For the latter it is necessary to take regular doses, probably daily, and each dose must be as small as possible, so long as it produces a satisfactory action of the bowels once in the day, which action need not, indeed had better not, be a loose one, as this cannot be looked upon as a normal condition. Sulphur is a mild and useful medicine; in the old days brimstone and treacle was used, but must have been decidedly nauseous. Nowadays sulphur is prepared in the form of lozenges to which no one can object. A lozenge every night at bedtime is often all that is requisite. Sulphur confection, a sort of jam, is also good.

Probably the most popular remedy for chronic constipation at the present time is cascara, prepared from the sacred bark (*Cascara sagrada*). Half a teaspoonful or one teaspoonful of the liquid extract should be taken at bedtime, or better still, a smaller dose in a mixture as follows :—

PREScription 40

Liquid extract of cascara sagrada	80 drops.
Tincture of nux vomica	80 drops.
Tincture of belladonna	20 drops.
Spirits of chloroform	2 drachms.
Tincture of orange	2 drachms.
Water to 8 ounces.	

An eighth part to be taken 3 times a day before meals.

Or a compound cascara and gentian tabloid may be taken at bedtime. Senna is a much-employed remedy, and is used in many forms. A teaspoonful of syrup of senna is suitable for children; senna tea—an

infusion of the leaves—with sliced ginger for adults, the dose being an ounce or two. A rather popular form now is an infusion of the senna pods (not leaves). A certain number of pods (the number to be learnt by experience, but seven or eight are about an average dose), are placed in half a tumblerful of cold water in the morning, and the brown, tasteless infusion taken at bedtime. This is done daily, the dose increased if necessary, and decreased if possible until quite a few pods are found to be enough. When the bowels are opened regularly, a dose every other day may be tried, and finally it may be discontinued altogether. Senna and sulphur are both used in the common aperient—compound liquorice powder. This is a good medicine; it is usually taken in a dose of about a teaspoonful, at night or in the morning, stirred up in a little water.

Another useful medicine is aloes; it is the juice of the aloe leaf, and has a special effect upon the large intestine as a purgative, and on the small intestine as a tonic. It is the common ingredient in "Dinner pills," and as it is rather liable to gripe it is mixed with sedative drugs. It should not be used if there is any tendency to piles. The following is a prescription for a good dinner pill:—

PRESCRIPTION 41

Extract of socotrine aloes	.	.	.	.	2 grains.
Extract of nux vomica	.	.	.	.	$\frac{1}{2}$ grain.
Powder of ipecacuanha	.	.	.	.	$\frac{1}{2}$ grain.
Powder of ginger	.	.	.	.	2 grains.

Make a pill. To be taken daily before dinner.

Aloes is present in many pills—compound rhubarb pill, compound colocynth pill, colocynth and hyoscyamus pill—all of which are good purgative pills. Mild aperient pills may be taken for a long time without losing their efficacy, as is shown by Sir Lauder Brunton, in his lectures to the students at St. Bartholomew's Hospital. A friend of his took a pill every night for forty years without missing once, and found that it never failed in its effect.

Many natural mineral waters or their salts are much used as aperients. The amount of drugs contained in these is so small that if a chemist were to dispense them in the usual way they would have no effect, but when mixed by nature in the mineral waters they are most active. A few only need be mentioned—Hunyadi Janos, Apenta, Friedrichshall,

Carlsbad—of which a wineglassful with hot water should be taken on rising in the morning.

No account of the treatment of chronic constipation would be complete without mentioning castor oil, which is efficacious and safe, though decidedly unpleasant. One objection to it is that it is liable to produce constipation after it has acted. The taste may be hidden by mixing the castor oil (a tablespoonful) with a wineglassful of milk in a bottle, and shaking them up until the oil cannot be distinguished. Or the oil may be mixed in a wineglass as follows: First put in a little water or peppermint-water, wetting the glass well, then pour in the castor oil and then a little brandy. The oil will be sandwiched between the other two fluids.

Effervescent saline medicines are useful, such as seidlitz powder, magnesia, and many patent salts, and when taken in this form the dose is not unpleasant. Purgative preparations of mercury are necessary in some cases, but should be used with care and but seldom. The chief are blue pill (3 grains), calomel ($\frac{1}{2}$ grain to 2 grains), and grey powder (1 grain to 5 grains).

Lastly, to clear the lower bowel we may use enemata. When, for any reason, it is not possible to give aperients by the mouth, as in severe vomiting, or when a rapid action is desirable, this is the method to be employed. Glycerine injections are now very much the fashion, a teaspoonful or two being injected with a specially made syringe, or glycerine may be used in the solid form as a suppository. By this means an action of the bowels is brought on in a few minutes. Soap-and-water is equally efficacious. From three-quarters of a pint to a pint should be used, and the addition of an ounce of castor oil will make it more active. Other methods of treatment, and many more drugs, might be mentioned, but the foregoing are sufficient, as they are those found to be most useful in practice.

Finally, we would briefly recapitulate the treatment of chronic constipation. Practise regular habits, take sufficient exercise, avoid constipating food, and add to the diet laxative substances. When necessary, and only then, use laxative drugs, and avoid as far as possible strong purgatives. Take the simplest medicines regularly every day or several times a day, until the bowels have formed regular habits, and then gradually discontinue medicines altogether. And take only the smallest doses of any medicine that will produce the desired effect.

COLIC

Colic, or "intestinal colic," as we should more correctly call it, is a severe spasmodic pain in the stomach, known popularly as "gripes," or belly-ache. It is due to irregular and painful contraction of the muscular walls of the intestines, and occurs without any fever, a circumstance which distinguishes colic from several other diseases of more importance because they are more dangerous. The word colic is used also for several other forms of spasmodic pain, with a special adjective attached to denote the organ affected. Thus renal colic is applied to the intense pain produced by the passage of a stone along the ureter from the kidney, and hepatic colic in the same way is the pain produced by a gall-stone passing along the ducts of the liver. Both of these forms of colic are described elsewhere. Here our remarks will refer entirely to intestinal colic. The term, as originally applied, denoted colic of the large bowel, being derived from the Greek word *colon*, the large intestine, but muscular spasm of the small intestine must also be included, as in many cases it is not at all certain which part of the bowel is affected.

Undoubtedly colic occurs with especial frequency in nervous and sensitive people, and it will not therefore surprise us to hear that women are troubled by attacks of the complaint much more often than men; and most commonly when they are also subjects of hysteria. Nervous, high-strung men also are liable to it, and it is not uncommon in the young of both sexes. General ill-health, whether it be produced by overwork, worry, or by previous illness, predisposes to attacks.

Probably of all causes the most common is some irritation of the bowels by their contents, either undigested food which has undergone fermentation and produced a large quantity of gas, or long-retained material which has decomposed. Such foods as pork, shellfish, salt meats, unripe fruit, or high game are certain in some people to bring on an attack of stomach-ache, and will continue to do so until the bowel is able to expel them. Ices are the special fancy of many ladies, who are always tempted to take them at the most dangerous time, as when heated and tired, at a dance, or in the theatre, the result frequently being an attack of colic. Iced drinks are only a little less dangerous than ices.

Cold is dangerous in other ways; probably, indeed, it is the chief exciting cause of colic when acting on a bowel already irritated by un-

suitable food. There are many people who are sure to have an attack of colic if they get their feet wet and cold ; and in women this accident is very dangerous at the time of the periods. Chill to the abdomen is also often followed by colic, and care should be taken, by those who are predisposed, that the abdomen is well covered with warm clothing, a flannel belt or binder being worn even in the summer-time.

Emotional disturbance is quite sufficient to bring on an attack in some people, and probably acts indirectly through the nervous system. Great anxiety, fright or anger, or even mental fatigue the result of overwork, may all act in this way. Those who are obliged, by their occupations, to lead sedentary lives should particularly guard against the causes of colic, for the want of exercise itself strongly predisposes to it by causing indigestion, constipation, inactive liver, mental fatigue, and many other conditions.

Poisoning by the two metals lead and copper, more particularly the former, is characterised by the most severe attacks of colic ; indeed "lead colic" must be looked upon as a distinct variety of the disease. Lead enters the body in various ways ; in small quantities in the drinking water, which dissolves it off lead pipes or cisterns, or from lead cooking utensils ; workers in lead, plumbers and painters, swallow it with their food or inhale it in the air they breathe.

The one peculiar symptom of colic is pain. It comes on in attacks, and is usually felt first and most severely about the navel, but gradually

Symptoms. spreads over the abdomen, and may even wander about from one part to another. It is very acute, and makes the sufferer groan or cry out, and even double himself up in agony. It gradually passes off, and then returns as bad as ever. A very important fact is that this pain is always relieved by pressure, whilst the pain of the severe and dangerous complaints for which it may be mistaken is always made much worse by pressure. The pain of colic also is relieved by getting rid of wind, which usually accompanies it and produces great distension of the abdomen ; it rumbles about in the intestines from one part to another, causing movements that can be both felt and heard. Another feature which distinguishes simple colic from serious disease is, as we have seen, the absence of any fever. Nor is the pulse quickened ; indeed, in most cases the pulse is slower than the natural rate. Constipation is almost always present, either as a cause of the pain or as a result of the spasm, and, as a rule,

as soon as the bowels have been well cleared the attack of colic passes off.

There is no doubt that the pain of colic is very severe, as anyone who has watched an attack can bear witness. The face is pale, the features are pinched, the countenance expresses great anxiety and suffering, the body, and especially the feet, is cold, the skin bathed in a cold clammy sweat. The patient wanders about with his body doubled up, and with his hands pressed on his stomach, or lies down on his bed with the pillow pushed under his belly, or lies on his back with his legs drawn up against his abdomen, a picture of misery and suffering.

The duration of an attack of colic may vary from a few minutes to several days ; perhaps it may be said with truth that the more violent the attack the shorter will be its duration, but treatment is capable of mitigating the pain and shortening the attack. It should be applied as soon as possible, as neglected colic may end in enteritis, peritonitis, or other serious troubles. Fortunately, however, even the most severe attacks of uncomplicated colic end in complete recovery. The spasms of pain cease usually quite suddenly, and although the stomach feels sore and bruised the relief of the patient is a real pleasure to behold.

What should be done for this formidable pain ? First we must remove the cause by clearing out any undigested food and relieving

Treatment. constipation. The best means of doing this is to take a tablespoonful of castor oil with twenty drops of laudanum. Or the large bowel can be quickly unloaded by a large soap-and-water enema. A glass of hot brandy and water, or thirty drops of sal volatile, or some essence of peppermint or ginger or other spice, with hot water will relieve the pain and disperse the wind. A couple of soda-mint tabloids often give some ease. The patient should lie down, and hot bottles be put to his feet ; warmth should also be applied to the abdomen, either a good hot linseed poultice or a fomentation, or even a rubber hot-water bottle filled with boiling water. Massage to the abdomen in the direction of the colon (p. 104) is soothing, or rubbing with some sedative liniment such as belladonna, or soap and opium ; or the patient may even get into a hot bath and have the rubbing done whilst lying in the hot water. In extreme cases it may be necessary to give a hypodermic injection of morphia.

After the attack has been relieved the patient must live carefully

for some time, or another one will come on. The diet must be carefully regulated, the bowels must be kept active by suitable aperients in moderate doses. All risk of chill to body or feet must be avoided, and a flannel belt and warm woollen stockings should be worn. In most cases much benefit would be derived from a short course of the *nux vomica* and bismuth mixture (Pr. 29).

The treatment of the colic of children is discussed elsewhere, and also that for lead colic. Finally, it is necessary to remember the points which distinguish simple colic from the other painful affections with which it may be confused—obstruction of the bowels (from mechanical twisting or involution), peritonitis, and enteritis. If there is tenderness of the abdomen on pressure, or there is a hard swelling in any part of it, or if constipation is obstinate, or excessive vomiting is present, if the temperature is raised above the normal, or the pulse is increased in rapidity, or there is a tendency to exhaustion, or if there is any other reason to believe that the pain is produced by some cause more important than those we have mentioned as producing colic—be careful of treating the case yourself, and, if possible, obtain medical advice without delay.

DIARRHŒA

Diarrhœa will here be considered as a disease in itself, although it is often met with as a symptom of other complaints, such as cholera, dysentery, and typhoid fever; it is also frequently an accompaniment of the later stages of consumption. The action of the bowels is usually much increased in frequency in diarrhœa, but varies in different cases from two or even one action a day to an almost continuous discharge. The stools are loose and watery, and may be natural in colour, mixed with large quantities of bile, or almost colourless, with the appearance of dirty water.

The causes of diarrhœa are numerous, and it is necessary, as far as possible, to recognise the cause in each case, as upon it depends the line of treatment to be adopted. The treatment suitable

Causes. for one form of diarrhœa may only be the means of making another form much worse. The most frequent cause is some error of diet, some excess in eating and drinking, or indulgence in indigestible or irritating food. Excess of food may produce vomiting, and all of it be rejected, but more commonly much of it passes on into the intestines and there sets up irritation, a large amount of fluid is poured out from

the mucous membrane, the movements of the bowels are increased in force, and the contents are expelled in an undigested state. Many poisonous drugs produce diarrhœa, a fact to be remembered when diarrhœa rapidly follows the taking of food. It is difficult to say what articles of food will produce this condition in any individual case ; some persons are immediately upset by certain articles of food which another takes with impunity.

The diarrhœa produced by food must really be looked upon as Nature's attempt to work a cure, and in the treatment of this form of diarrhœa it is well not to try to check the action of the bowels too rapidly, and, indeed, in some cases it may be well to encourage it until we are sure that all irritant material has been carried out of the body. It seems a strange method of treatment for diarrhœa to give an aperient, but nothing cures such attacks more rapidly than a tablespoonful of castor oil with ten drops of laudanum. The oil empties the bowel, and the laudanum then acts as a sedative.

Next to food we find that climatic conditions are the most fruitful source of diarrhœa. The affection may be induced by exposure of the whole body to damp and cold, through wearing insufficient clothing ; or by chills incurred by getting the feet wet, or sleeping in a damp bed. It often follows rapid variations of temperature, such as hot days succeeded by cold nights, and many an attack can be traced to sleeping with scanty bed-clothing and an open window under such circumstances.

Diarrhœa is apt to occur in epidemic form, many persons being attacked at the same time. Such attacks are more likely to prevail during summer and autumn than during the colder seasons of the year, and it is well established that their prevalence is to a great extent dependent on the intensity of the solar heat, so that a temperature of over 60° F. seems to be almost essential. The attacks are called *summer diarrhœa*, from the time of their usual occurrence, or *choleraic diarrhœa*, or *English cholera*, from the character and severity of their symptoms. Now it has also been shown that decomposition of organic matters in the neighbourhood of dwellings, and the introduction of products of decomposition into the food, drink, or air, have been a direct exciting cause of diarrhœa in a great number of epidemics. As decomposition of organic material takes place much more rapidly in hot and dry seasons, and is much more rapidly spread about by winds when dried into a state of dust,

we can easily understand one of the chief causes of epidemic diarrhœa. In cold and wet seasons there is less diarrhœa, because organic waste material is more rapidly washed away by the rain, and decomposes less rapidly in the cooler atmosphere.

This brings us to the importance of attending to the hygienic conditions of our houses, especially those in which we spend the summer, for wherever the drainage is imperfect, and the drinking water impure, diarrhœal diseases are certain to be prevalent. How often is an otherwise delightful summer holiday in a country village or an old farmhouse completely spoiled by the illness of some member or members of the party from severe diarrhœa! The prevention of such misfortunes is in our own power if we will but take the proper precautions. The symptoms of summer diarrhœa come on very suddenly, with violent vomiting and purging; the vomited matter is at first the contents of the stomach, then bile and mucus, and the motions are the ordinary contents of the bowels in a fluid condition, but both rapidly become watery and colourless, the stools having the appearance of rice-water. There are also much pain in the stomach, cramp in the limbs, and great thirst. These severe symptoms soon bring on great exhaustion, with weak pulse, feeble voice, and very low temperature. This is the stage of collapse, and in some measure resembles that of cholera. With suitable treatment, however, most healthy persons rapidly improve, but delicate children frequently sink from exhaustion. Such cases are quite unfit for domestic treatment but the best medical advice should be obtained at once.

Another distinct variety of diarrhœa we may call *nervous diarrhœa*, as it is produced by causes that act through the nervous system. Mental emotions such as worry, anxiety, fear, or excitement act upon the nervous system, and through it increase the ordinary muscular movements of the intestines and the secretion of the various fluids, and as a consequence the contents are hurried along the bowel and are evacuated in a half-digested, fluid state. This condition must be familiar to all, for who has not at some time or other experienced such an effect from the imminence of an examination, the fear of a surgical operation, the excitement of starting for a long journey, or some similar incident?

One variety of this "nervous" diarrhœa has received the name of *lientery*, which means "a smooth bowel." In it an action of the bowels takes place immediately after food is taken; after every meal, the muscular movements of the bowels are so active, or the bowels themselves are so

sensitive, that the food is hurried along the alimentary canal at such a rate that it appears unchanged, or only slightly changed, in the stools. If these be examined, starch granules, fatty particles, and curds of milk can be distinctly seen.

Sir L. Brunton has described a peculiar condition which he calls *morning diarrhœa*, in which the patient wakes up rather early in the morning with a desire to go to the closet; he has two or three loose motions before or immediately after breakfast, but after midday is quite well and able to walk about without trouble. He cures such cases by allowing no liquid at all after six o'clock in the evening, and finds that medicines are unnecessary.

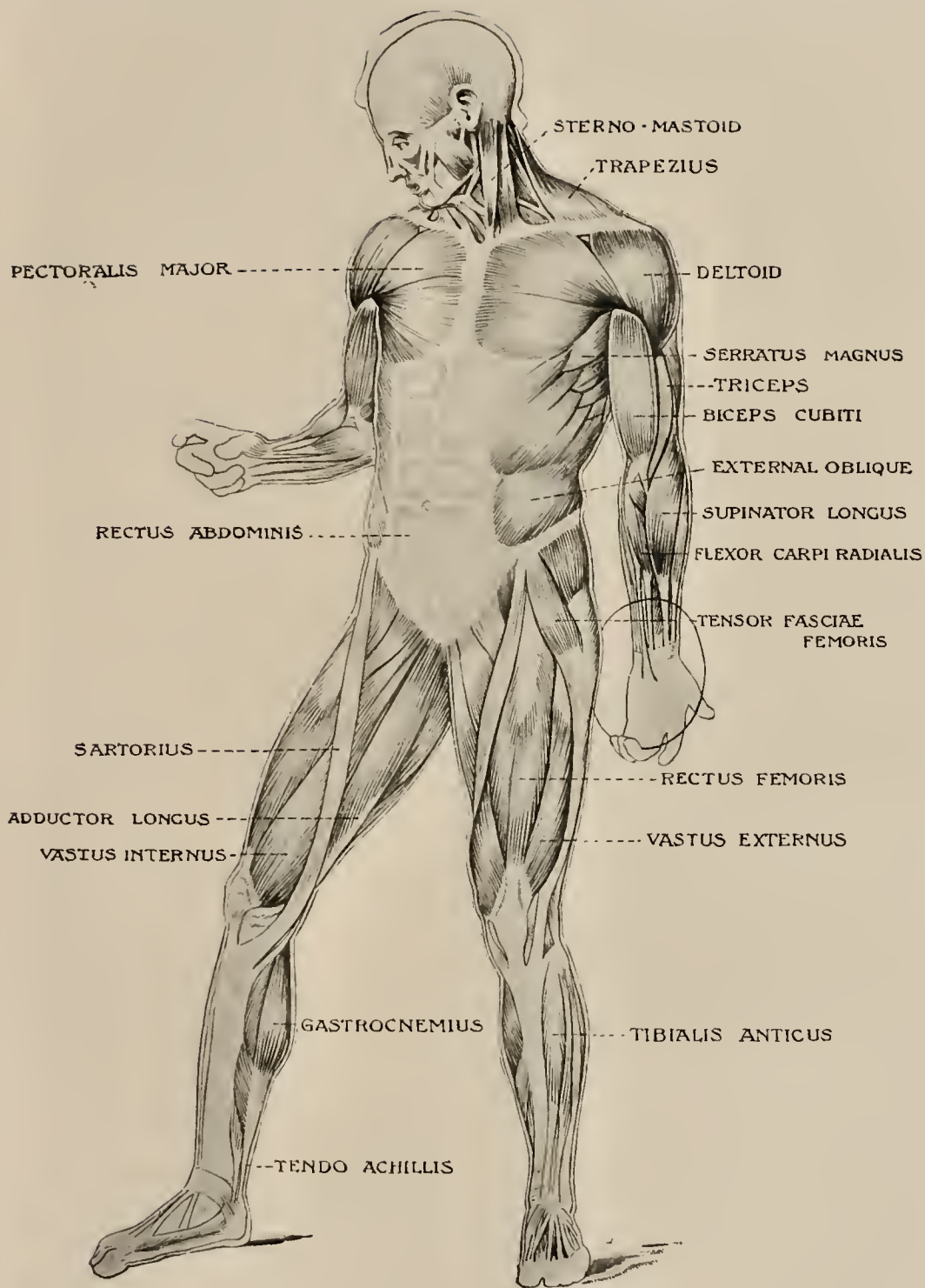
Diarrhœa is, as we have seen, a disease in itself, and there may be no other symptoms. But usually other symptoms are present. Pain is very common; it is felt in any part of the abdomen or all over it, as a slight soreness, or as a severe aching, colicky pain. The bowels also are felt to be in violent movement, and vomiting is very commonly present, and may become most distressing. The great loss from the body soon causes exhaustion, a disagreeable sinking sensation in the pit of the stomach, with a general feeling of faintness. The temperature is unchanged or below the normal, the skin is dry, the urine scanty, and the pulse weak and feeble.

The length of an attack is most indefinite, and depends much upon both the cause and the treatment. It may last but a few days, or it may continue for weeks, and in chronic diarrhœa runs on for years.

Chronic diarrhœa is sometimes a sequel to typhoid fever, dysentery, or chronic indigestion. As it frequently attacks returned Anglo-Indians, it will be dealt with under the head of Tropical Diseases.

We must now consider the treatment for these various forms of diarrhœa. First of all we must do our best to discover the cause, and if we can trace some indiscretion in diet, or some possible irritating food, give an aperient to clear out the bowels as quickly as possible. Castor oil, a tablespoonful with ten drops of laudanum, has already been mentioned, but a teaspoonful of Gregory's powder is almost equally suitable, or five grains of compound rhubarb pill.

If the medicines suitable to check diarrhœa are given as a regular routine before the aperient, much harm may be done, for although the diarrhœa may cease, the irritation of the intestines by their contents will



SUPERFICIAL MUSCLES.

continue, and very possibly an attack of inflammation of the bowels be set up. On the other hand, aperients must not be given as a matter of course in every case, for food is not always the exciting cause. If, however, the difficulty in diagnosis is great, we are less likely to err if we give the aperient.

Having cleared the bowels, what shall we give to soothe them and check the diarrhœa? Nothing is better and safer than chalk, in the form of the chalk mixture of the Pharmacopœia, two tablespoonfuls being the dose. This should be repeated every two or three hours, or a dose may be given after every loose action. Another useful mixture is the following :—

PRESCRIPTION 42

Carbonate of bismuth	80 grains.
Bicarbonate of soda	80 grains.
Mucilage of gum	$\frac{1}{2}$ ounce.
Spirits of chloroform	80 drops
Peppermint water to 8 ounces.	

An eighth part to be taken every 2 or 3 hours.

Opium is a valuable drug in the treatment of diarrhœa, but must be used with care and never given to children without medical advice. It is the most powerful sedative to the bowels, and checks their muscular action. The tincture of opium in ten-drop doses may be added to either the chalk mixture or the bismuth mixture (Pr. 42) if the diarrhœa is severe or there is much pain. For those who are travelling or who live abroad where medical aid is unobtainable, a very convenient medicine is the aromatic powder of chalk, of which ten to sixty grains may be taken, half a teaspoonful being an average dose. It may be obtained combined with opium, and both preparations are made in tablet form, each tablet containing five grains. An alternative medicine to the above (Pr. 42) is one containing sulphuric acid, which acts as an astringent to the bowels, and is perhaps more pleasant to take.

PRESCRIPTION 43

Aromatic sulphuric acid	80 drops.
Syrup	$\frac{1}{2}$ an ounce.
Water to 8 ounces.	

An eighth part to be taken every 2 or 3 hours.

When there is much griping pain and flatulent distension of the bowels with frequent actions, chlorodyne gives great relief; it is a patent medicine

and corresponds to the tincture of morphia and chloroform of the Pharmacopœia. It may be taken with water in five or ten drop doses, or in the following mixture :—

PRESCRIPTION 44

Tincture of morphia and chloroform	.	.	.	.	80 drops.
Dilute sulphuric acid	.	.	.	.	80 drops.
Water	to 8 ounces.				

An eighth part to be taken every hour as long as necessary.

The sufferer from *summer diarrhœa* should begin with the castor oil and laudanum dose already recommended (p. 120), following it up with camphor—five drops of the essence of camphor or ten drops of the spirits of camphor on a piece of sugar must be taken every fifteen minutes for half a dozen doses, and when the severe symptoms have passed off it should be discontinued, and the chalk or bismuth mixtures (p. 121) used instead. Simple drinks such as milk and soda-water, chicken broth, and barley-water should be taken to flush the bowels and relieve the thirst. In the stage of collapse, hot poultices and fomentations to the abdomen should be applied, and some brandy and water given in small quantities at a time. To relieve the cramps the parts should be rubbed with chloroform liniment.

For *nervous diarrhœa* the following sedative draught is recommended, and if the attack is brought on by food it should be taken just before a meal :—

PRESCRIPTION 45

Bromide of potash	.	.	.	.	80 grains.
Tincture of cardamoms	.	.	.	.	2 drachms.
Chloroform water	to 8 ounces.				

An eighth part to be taken 3 times a day.

And if this is found to be not strong enough, tincture of opium in ten-drop doses should be tried.

For *lienteric diarrhœa*, arsenic is an almost certain cure :—

PRESCRIPTION 46

Solution of arsenic	.	.	.	.	16 drops.
Bicarbonate of soda	.	.	.	.	80 grains.
Tincture of lemon	.	.	.	.	2 drachms.
Water	to 8 ounces.				

An eighth part to be taken 3 times a day immediately before meals.

Chronic diarrhœa is a most obstinate complaint and long resists all methods of treatment. The general health must receive attention, and the anæmia be removed: this requires tonic drugs such as iron, arsenic, quinine, and strychnia, and may be combined with astringents as in the following prescriptions:—

PREScription 47

Tincture of perchloride of iron	.	.	.	80 drops.
Sulphate of quinine	.	.	.	8 grains.
Dilute sulphuric acid	.	.	.	80 drops.
Chloroform water	to 8 ounces.			

An eighth part to be taken 3 times a day.

PREScription 48

Solution of strychnia	.	.	.	24 drops.
Dilute nitro-hydrochloric acid	.	.	.	80 drops.
Spirits of chloroform	.	.	.	2 drachms.
Decoction of logwood	to 8 ounces.			

An eighth part to be taken 3 times a day.

But in all forms of diarrhœa the diet requires the utmost attention, and if this be neglected no amount of dosing will have any effect.

Many acute attacks may be cut short altogether by entire abstinence from food for a short time, thus giving a complete rest to the digestive organs. In all cases food must be taken most cautiously.

Diet
Treatment in
Diarrhœa. No solid food whatever is admissible, and the fluids must be of as bland a nature as possible. Nothing must be taken hot, but everything cold or at the most tepid. Gruel, arrow-root, Benger's food, and milk are suitable: they must be taken in small quantities, a few tablespoonfuls at a time, and at short intervals. To assuage thirst fluids are necessary, and barley-water, toast-water, linseed-tea, white of egg and water, and lemon-juice and water can be allowed. Milk must be diluted with an equal quantity of soda-water or a third of lime-water, or a tumblerful of milk with a tablespoonful of brandy and a few bits of ice may be sipped. Meat broths, such as chicken, mutton, or beef-tea, are usually well borne, but they must be quite weak. As the symptoms subside, tapioca, sago, rice puddings, and bread and milk should be given with care, and ordinary diet gradually returned to as the digestion resumes its duties.

In the less violent attacks, as in all forms of diarrhœa, it is most necessary to avoid any irritating or laxative food; the diet suitable for constipation is bad for diarrhœa. As Sir Lauder Brunton tersely puts it: "Avoid all skins and bones, strings and stones"—stringy parts and skins of fish, flesh, fowl, fruit, and vegetable and anything that leaves much residue, because it cannot be digested. Avoid fresh or cooked fruit or sugar in any form. A good rule is to eat nothing that could not pass through a fine sieve.

In chronic diarrhœa a milk diet is often the best means of bringing about a cure; fortunately it is possible for a person not only to live but to thrive on a purely milk diet. Milk can be made more easy to digest by being previously peptonised. Other cases of chronic diarrhœa are cured by a purely animal diet consisting of very lightly cooked mutton, veal, chicken, pigeon, and game; this is continued until improvement is evident, and then milk and starchy foods are gradually added.

Finally, in addition to diet and drugs, we must attend to the general rules of health, must avoid cold, damp, and sudden changes of temperature, and must protect the feet with warm stockings, and the abdomen with warm underclothes and a flannel belt.

CHAPTER VI

DISORDERS OF THE LIVER AND PERITONEUM

Biliousness — Congestion — Inflammation — Chronic Inflammation or “Gin-drinker’s Liver”—Inflammation of the Bile-ducts—Gall-stones—Jaundice —Peritonitis.

BILIOUSNESS

THERE must be few of us who have never indulged in the uncomfortable set of symptoms which make up a bilious attack. The name implies that all such symptoms are in some way connected with the liver, and caused by something unsatisfactory in its action: either that it secretes too much bile or not enough, or that bile in some way permeates the system and upsets us generally.

The ancients gave the liver so bad a character that when anyone was particularly low-spirited and miserable they said it was melancholia from which he suffered. Now, the word melancholia is derived from two Greek words meaning “black bile,” and was employed because low spirits were supposed to be caused by an ill-regulated liver. At one time it was common for doctors to speak of a “bilious” temperament—that is, one in which the liver was supposed to be most predominant in influencing the condition of the body, in contradistinction to the sanguineous temperament, in which the blood or heart took the most active part. The liver was therefore blamed as the cause of all sorts of ailments whose true explanation was not scientifically understood. At another stage of medical knowledge the liver was looked upon as an organ that had very little use at all—as practically a useless structure.

Nowadays we take a middle course. We know that the liver is of the very greatest importance in the animal economy, that it is the largest gland in the body, that it secretes a large quantity of the yellowish fluid we call bile, which aids greatly in the process of digestion, and that it also acts in many other ways which, if less understood, are decidedly more important. It acts, as we have seen, as a storehouse of nourishment, which is supplied to the body at those

times when the digestion is at rest. Derangements of the liver, therefore, may well produce conditions of ill-health, and although all those conditions which we jumble together under the term biliousness are certainly not due to the liver's dereliction of duty, yet many of them undoubtedly are.

Very many attacks of "biliousness" ought more properly to be called "gluttony," for they are simply due to over-eating or over-drinking. There is no doubt that the prevailing error in

Causes.

dietetics is in the direction of excess; it is much more common for people to eat too much than too little. Fortunately, in health the body is very accommodating, and for a long time bears with the excessive quantities of food it has to dispose of, and in some way gets rid of the large amount of waste material. We have but to look round and watch our neighbours' habits, and see the quantities of rich, sweet, and fatty substances they eat and drink at their meals, to realise how overworked their poor livers must be. A large amount of the excess is carried off by the bowels as waste material, but much of it is absorbed into the body by digestion, and passed on to the liver for disposal. The liver is choked up with material, the blood becomes full of it, and every now and then the body can bear it no longer, and there follows a sharp bilious attack during which large quantities of waste are got rid of. The overworked liver also gets a rest, for food is not taken through want of appetite and a feeling of nausea.

We do not feel that we run much risk of contradiction when we say that a good bilious attack has the most beneficial effect and makes the person feel ever so much better afterwards. He feels brighter and fresher and more energetic, can do much more both bodily and mentally, and can allow himself many indulgences that at another time would upset him at once. This must be explained by the fact that the body has freed itself of an accumulation of waste and poisonous material. Many people have such attacks at fairly regular intervals of, say, ten days to a fortnight. Between the attacks they are occupied in diligently loading themselves up for a fresh attack.

The foods most likely to produce biliousness are those which are fatty and sweet. In some people a very moderate indulgence in such foods produces derangement of the liver. Alcoholic drinks are equally injurious; they pass, in the process of digestion, through the liver, and, even in small quantities, produce a temporary congestion of it, whilst if taken at frequent intervals or in excessive quantities the congestion becomes permanent, and the healthy action of the organ

is disturbed. Above all, sweet wines and the heavier malt liquors promote biliousness.

All the foregoing foods and beverages act more injuriously on those who lead lazy and sedentary lives, but those persons who take much active exercise can indulge themselves in the pleasures of the table with greater impunity, because muscular exertion uses up and carries off the waste products. As people grow older and less energetic, exercise is neglected, and greater care must be taken in limiting the amount that is eaten and drunk. Another reason why sedentary habits are injurious is that they keep people from obtaining plenty of fresh air. Oxygen is a splendid preventive of biliousness, and helps to carry off waste products by oxidation.

Liver derangements are of common occurrence in those who live in hot climates, the high atmospheric temperature being evidently favourable to congestion and sluggishness of the liver, and this tendency is much increased by the common habit of continuing to indulge in the same diet and drink that are suitable for more temperate climes. The "liver" which occupies so much of the thoughts of the old Anglo-Indian is often due more to indiscretions in this respect than to the climate of India. But the effect of heat on the body is to drive the blood to the internal organs, and the liver suffers especially from this, as it has in its many blood-vessels a very large capacity for receiving blood.

There is little doubt that there are some people who have a special tendency to biliousness. They seem to be constantly working up to an attack, and no amount of care or abstinence is capable of preventing it. This condition may have been acquired as the result of carelessness and indulgence, or it may be inherited.

Among the affections sometimes described as bilious which have nothing to do with the liver is megrim, or sick headache, which is a nervous condition, and due to exhaustion of the nervous system from fatigue, noise, nerve-strain, or worry. Headache, nausea, and vomiting are present, but the liver is in no way the offending organ. Another condition which produces symptoms very similar to those of biliousness is faulty sight, which causes strain and fatigue of the eye muscles. Headaches due to eye-strain are often accompanied by nausea and vomiting, and recur at frequent intervals, but may be entirely cured by wearing proper glasses without any treatment applied to the liver.

Now let us turn to the symptoms of biliousness. The sufferer complains of feeling generally out of sorts, of a sense of malaise; he is

disinclined to exert himself, and feels drowsy and heavy; he sleeps badly at night, and makes up for it in the day. His tongue is dirty and

Symptoms. furred, and is very often large, flabby, and indented on the sides by the teeth. There is an unpleasant, bitter taste in the mouth; all food seems flavoured alike, and none of it is agreeable. The appetite is always affected; there is no desire for food, and if any is taken it is very likely to produce nausea. A perfect loathing of food is often complained of, especially of anything that is fatty or greasy. The digestion is disturbed, food produces discomfort and indigestion, flatulence and distension, with eructations of acid and bitter fluid and unpleasant gas. The bowels are irregular; generally they are obstinately constipated; sometimes there is diarrhœa, or the two conditions may alternate. The stools are often pale, hard, and offensive, and passed with much straining. This and the constipation are likely to bring on an attack of piles, which is a common complication of many liver derangements. The face and the whites of the eyes are sallow and discoloured, the countenance is heavy. There is usually headache, a dull, heavy pain, which is made much worse by stooping or moving. It is generally most troublesome on getting up in the morning, but may continue, on and off, all day. The limbs ache and feel heavy, and there is a burning or scalding sensation in the soles and palms. Giddiness is common, with dimness of sight and black specks floating before the eyes. In many cases there is a sensation of a dull pain and of weight in the region of the liver, and of pain in the right shoulder, both of which are often increased by taking food. Depression of spirits is generally marked; the patient seems to have a weight of responsibility and anxiety on his shoulders, and worries without any real cause. His irritability is marked, and his friends find him anything but an agreeable companion.

These symptoms may continue for days until removed by treatment, or may culminate in an acute bilious attack with violent retching and vomiting, which expels the offending matter and restores the patient to his normal health.

The acute attack is really an attack of indigestion, and might have been prevented by timely treatment. The remedies for it are starvation

Treatment. and rest. There is no doubt that many a bilious attack might be starved out. To cure the attack, therefore, it is best to go and lie down in a darkened room, and take no food, or, at any rate, only a very small quantity—a little cold beef-tea or a cup of strong tea with little milk and sugar, and a piece of dry toast. As

the sickness passes off, a little milk and soda may be retained, and gradually a return to ordinary diet is possible. The following effervescent mixture will be found a great help, and will soothe the irritable stomach :—

PRESCRIPTION 49

Bicarbonate of soda 2 drachms.

Tincture of lemon 2½ drachms.

Water to 8 ounces.

An eighth part to be taken every 2 or 3 hours with a

powder of Citric acid 10 grains.

To this, with advantage, may be added carbonate of bismuth 10 grains, and a drachm of gum mucilage to keep it in suspension.

To prevent bilious attacks it is necessary to give careful attention to the diet : take, if possible, less food than usual, and especially leave off all rich, highly flavoured and sweet dishes and all alcoholic drinks. Take as much fresh air and exercise as possible. A daily constitutional may cure your trouble. If possible play some outdoor game—lawn tennis or golf. Try the effects of horse exercise; it is even better than walking, and the shaking it gives you will have the effect of squeezing the bile through the liver and sending it on its course with healthy energy. Plenty of fluid should be drunk, not so much at meal-times as between. Nothing is better than pure water, which thins the bile, washes through the intestines and stomach, and clears away the waste material of the whole body. Drink a good glassful of water, either hot or cold, every morning whilst you are dressing, and every night when you are going to bed. Sleep in a well-ventilated room, and do not have too many clothes on your bed. Above all things, keep the bowels acting regularly every day. The best aperient for regular use is one of the mineral waters or the salts prepared from them. Among those that can be recommended are Apenta, Hunyadi, Friedrichshall, Rubinat, and Carlsbad Sprudel salts. If you feel that, in spite of your care, an attack of biliousness is coming on, take a pill, compounded as follows :—

PRESCRIPTION 50

Mercury pill 2 grains.

Colocynth and hyoscyamus pill 3 grains.

(For an adult.) Make a pill, to be taken at bed-time.

Carry it off with a dose of mineral water in the morning.

To tone up the liver and encourage its action, either of the following mixtures may be taken for four or five days :—

PRESCRIPTION 51

Juice of taraxacum	$\frac{1}{2}$ ounce.
Bicarbonate of soda	$2\frac{1}{2}$ drachms.
Tincture of nux vomica	80 drops.
Tincture of lemon	$2\frac{1}{2}$ drachms.
Chloroform water to 8 ounces.	

An eighth part to be taken 3 times a day before food.

PRESCRIPTION 52

Dilute nitro-hydrochloric acid	80 drops.
Tincture of nux vomica	80 drops.
Tincture of orange	2 drachms.
Spirits of chloroform	2 drachms.
Water to 8 ounces.	

An eighth part to be taken 3 times a day after food.

Fortunately biliousness is a condition which can be treated with great benefit, but it requires a good deal of care and perseverance. Though it can hardly be said to shorten life, it often grievously interferes with one's enjoyment and with the power of doing work with any vigour or satisfaction.

CONGESTION OF THE LIVER

This affection is more frequently met with in the tropics than at home. In temperate climates its chief cause is excess in eating and drinking, especially in persons of sedentary or indolent habits. Indulgence in rich and irritating food and frequent imbibition of spirituous liquors, especially between meals, causes an increased flow of blood to the liver, its vessels become full or congested, as it is called, and if the producing causes are sufficiently prolonged or oft-repeated, a chronic congested condition is the result. Chills after getting hot with exercise also sometimes produce this condition, and it is not uncommonly met with in women at the change of life. Lastly, anything that prevents the free escape of the blood from the liver causes congestion of it. The congestion is then spoken of as passive. It is a frequent result of many forms of heart disease and some affections of the lungs; of the latter, pneumonia and emphysema are those which are most commonly complicated by liver congestion. Sometimes poorness of the circulation from a weak heart allows it to occur.

The disease is not easy to recognise, and the symptoms are those usually connected with what is popularly called “sluggish liver,” and

Symptoms. for these we must refer the reader to the description of that condition under the heading of Biliousness. Of course, when heart or lung disease is present, the congested liver is only of secondary importance, and the trouble will disappear if the original affection can be removed. People who suffer from congested liver are also often troubled by “piles,” or hæmorrhoids, which are produced by the same conditions, and bleeding from the piles often gives relief to the liver symptoms.

The treatment depends upon the origin of the congestion. In “passive” cases the heart or lung trouble must receive attention.

Treatment. In acute cases, caused by cold or indiscretion, the patient should go to bed and have a hot poultice applied over the liver, or a fomentation sprinkled with spirits of turpentine. The bowels should be cleared with a grain of calomel at bedtime and a dose of Carlsbad salts the next morning. The diet must be light and chiefly fluid, and no alcohol should be taken. In gouty persons, whose urine grows thick with sediment when cold, the following medicine is useful:—

PREScription 53

Juice of taraxacum	.	.	.	.	.	1 ounce.
Bicarbonate of potash	.	.	.	.	.	2 drachms.
Peppermint water	to 8 ounces.					

An eighth part to be taken 3 times a day, 20 minutes before meals.

In the more chronic forms of congestion, which occur in “old Indians,” especially when it follows ague, an acid mixture with quinine is more advisable.

PREScription 54

Juice of taraxacum	.	.	.	.	.	1 ounce.
Sulphate of quinine	.	.	.	.	.	8 grains.
Dilute nitro-hydrochloric acid	.	.	.	.	.	80 drops.
Tincture of orange	.	.	.	.	.	2½ drachms.
Chloroform water	to 8 ounces.					

An eighth part to be taken 3 times a day an hour after meals.

Lastly, in the most chronic and obstinate cases, much benefit may be expected from a visit to a spa, such as Harrogate, Cheltenham, or Carlsbad.

LARDACEOUS DISEASE

This is a disorder of the liver which requires but a few words. It produces a perfectly painless enlargement of the organ, and occurs in persons who have for a long time suffered from severe wasting disease, such as consumption, or from long-continued free discharge of "matter," the latter being most common in disease of bones or joints. Nothing can be done to relieve this condition, but if the cause is removed it gradually improves. For instance, if a limb is removed from which large quantities of matter have discharged, the liver trouble will pass away.

ACUTE INFLAMMATION OF THE LIVER

Inflammation of the liver (hepatitis) is usually the result of exposure to the influences of tropical heat with rapid changes of temperature, combined with malaria, irregular habits of life, and spirit-drinking. It is most often complicated with inflammation of its surrounding membrane (perihepatitis). Occasionally the inflammation may be so severe that matter forms in the liver, producing an abscess. All these conditions will be found fully described in the chapter on Tropical Diseases.

CHRONIC INFLAMMATION OF THE LIVER

Is called technically cirrhosis of the liver, and popularly "gin-drinker's liver." With very few exceptions this disease is produced by excess in the drinking of alcoholic beverages. The more potent **Cause.** the form in which the alcohol is taken, the more certain is it to produce disease of the liver. Undiluted spirits of all kinds are most potent; diluted spirits come next, and wine and beer follow, but are much less injurious. As we have shown in our description of the digestive processes, all fluids taken up by the blood-vessels of the intestines are carried directly to the liver, and pass through its substance. If these fluids contain large quantities of alcohol, an irritation of the liver substance is set up, and by the continuance of the indulgence this irritation is maintained, and finally becomes permanent. The liver at first may be somewhat enlarged, but it soon contracts, becomes hard and irregular on the surface, and has received the name of "hob-nailed liver" from this condition.

The symptoms come on very slowly and insidiously, and the habit of excessive spirit-drinking may have been indulged in for many years before the disease of the liver shows itself, but when the symptoms once

appear, probably irreparable damage has been done. A dull pain is felt in the right side, accompanied with symptoms of indigestion, wind, nausea, and constipation. Later on "morning sickness" sets in, consisting of dry retching every morning before breakfast, by which

Symptoms. nothing but a little mucus is brought up; the bowels, too, become loose; they are liable to act before breakfast, and two or three relaxed actions a day are not uncommon. The patient looks ill; he grows sallow and thin, and may even become slightly yellow from jaundice. His fears are probably now excited by the frequent remarks about his health from his friends; he may realise that his habits are the cause, and may struggle in secret to overcome them. The tippling, however, continues, and he advances on his downward path; his face becomes congested and bluish-looking, his eyelids grow puffy, his legs are heavy and swollen, and his stomach enlarges. The digestion is much affected, appetite is lost, and chronic gastric catarrh is set up, with nausea and vomiting. The struggle against drink probably proves futile, the patient's friends attempt to interfere, and he promises to reform; but his character deteriorates with his health, and he lies freely so long as it secures him his coveted drink. He gets careless of his appearance, hopelessly incapable in his work, and dirty in his habits. He now can hardly take any food; he merely lives for the drink, and is only happy when he gets it. The dropsy of the abdomen increases, the legs get enormous; he may suffer from hæmorrhages, sometimes from the stomach, but much more frequently from the bowels as a result of "piles." These may give some temporary relief. But, with such slight exceptions, the disease makes continuous progress, and the patient, in a miserable plight, grows weaker and weaker, and dies from exhaustion. When once the symptoms of cirrhosis are well established it is not likely that the patient will live for more than a twelvemonth, unless, of course, he is able to relinquish his habit, put himself under restraint, and be kept by force from all alcoholic drinks.

As long as alcohol is taken the symptoms grow more serious. The habit must be stopped at once, for there is no truth in the rather popular idea that there is danger in suddenly stopping

Treatment. drink in such cases. Encourage the patient to take food as simple, unirritating, and yet nourishing as possible. Vegetable bitters are useful, such as calumba, gentian, or nux vomica; they improve the tone of the stomach and encourage the appetite. Either of the following mixtures may be taken:—

PRESCRIPTION 55

Tincture of calumba	. . . . .	3 drachms.
Iodide of potash	. . . . .	24 grains.
Tincture of capsicum	. . . . .	24 drops.
Tincture of nux vomica	. . . . .	80 drops.
Chloroform water to 8 ounces.		

An eighth part to be taken 3 times a day half an hour before food.

PRESCRIPTION 56

Extract of taraxacum	. . . . .	1 drachm.
Tincture of ginger	. . . . .	2 drachms.
Bicarbonate of soda	. . . . .	2 drachms.
Spirits of chloroform	. . . . .	2½ drachms.
Infusion of gentian to 8 ounces.		

An eighth part to be taken 3 times a day half an hour before meals.

The bowels must be kept acting freely and regularly by saline medicines, such as Carlsbad or Epsom salts. Exercise is beneficial, such as walking or riding; change of air and scene should be tried, and particularly a visit to some interesting health resort, where the mind can be occupied and interested and the body can recover its vigour. Such places as Carlsbad or Homburg can be recommended, but the place must, of course, be chosen to suit the patient's circumstances. The treatment of dropsy is described elsewhere (p. 180).

INFLAMMATION OF THE BILE-DUCTS

Is almost always associated with stomach troubles, such as gastritis or indigestion. The catarrh or inflammation of the lining of the stomach

Cause. and intestines spreads up the bile-duct and produces sufficient swelling to block the very narrow passage and prevent the passage of bile along it.

There are usually first the symptoms of the stomach trouble, such as nausea, vomiting, loss of appetite, furred tongue, and sometimes

Symptoms. diarrhœa. Then jaundice comes on, the patient gets yellow all over, the colour being particularly marked in the white of the eyes. This form of jaundice lasts three weeks or so, and then, as the other symptoms disappear, gradually subsides. Practically all cases of this complaint get well, but if the jaundice lasts much over the three weeks our suspicions should be aroused, as then it is possibly produced by some more serious complaint.

In the treatment the first attention should be given to removing the stomach trouble, for by doing so we relieve the inflammation of the bile-ducts. A good hot linseed poultice to the region of the liver is always safe, and the medicines recommended for gastritis and dyspepsia (Pr. 26 or 29) should be used, followed by the acid tonic mixture (Pr. 39). An aperient to clear the bowels should be one of the first steps in the treatment.

GALL-STONES

Gall-stones are formed either in the gall-bladder or, less frequently, in the ducts of the liver. If the bile is retained in the bile passages for a long time, it becomes thicker and more concentrated, and a gall-stone may easily be produced.

Gall-stones may occur singly, and are then round and fairly smooth, but they are more frequently multiple, and as many as a hundred or more have been removed at a single operation. When a number of stones are formed together in the gall-bladder they become flattened or faceted, as it is called, from pressure against one another. If, therefore, after a gall-stone has been passed by the bowels it is found to be flattened, other stones must be expected; if it is regular in shape and round, there is reason to hope that it is the only one.

Gall-stones vary much in size: they may be quite small, like gravel, or large masses several inches in circumference, and of sufficient size to block the bowel. The common colour is a pale brown, but they vary from white to black through all shades. The chief ingredient is a substance called cholesterine, which is probably derived from the nervous organs; this is mixed with the colouring matter of the bile, and stuck together with thick mucus. Gall-stones sink in water when fresh, but when thoroughly dried they lose weight, and will float.

Children are very seldom affected by this disease; usually it is met with in persons over thirty years of age, and it is more common in women than men, perhaps because the lives of women are more sedentary than those of men, for want of exercise strongly predisposes to the formation of gall-stones.

Over-eating, and especially excess in rich foods and made-up, strongly flavoured dishes, is among the predisposing causes, and it is thought that the somewhat rare habit of taking one meat meal in the twenty-four hours has a similar effect, by allowing the bile to remain in the gall-bladder for too long a time. It is a very common thing to find that persons who are troubled with

gall-stones are in the habit of drinking much less than the proper quantity of fluid, and it is evident that this want of fluid in the body may have the effect of making the bile thicker and more concentrated.

There is a curious coincidence which has never been quite satisfactorily explained, namely, that cancer of the gall-bladder is very frequently met with in persons who have been long troubled with gall-stones. This may be due to the constant and long-continued irritation caused by the stones. Whatever may be the explanation, the fact suggests that the sooner the gall-stones are got rid of after they once produce symptoms the better.

Probably for every individual who has gall-stones, and knows it, there is another who has them without having the slightest suspicion of the fact, the gall-stone being comfortably accommodated in the gall-bladder. If, however, the stone begins to wander, and finds its way into the ducts, trouble begins, its severity depending to a great extent upon the size of the stone. If it is quite a granule it may pass along the ducts and find its way into the bowel, causing no pain in its passage. The ducts are very narrow tubes, about the size of a goose-quill, and will allow passage to no stone of any size without producing the most severe train of symptoms.

The pain that attends the passage of an ordinary gall-stone through the duct is agonising, and is called biliary colic. It is usually shortly

Symptoms. after a meal that the symptoms start, probably because the stone is carried from the gall-bladder into the duct by the flow of bile on its way to join in the process of digestion. A severe muscular exertion may have the same effect. A sudden pain is felt in the liver region (the upper part of the abdomen on the right side), which is described as shooting, burning, or stabbing, and which gradually spreads downwards to the navel and upwards to the right shoulder. It is accompanied with vomiting, violent shivering, and fever. The pain is so severe that the patient writhes with it, doubles himself up, and constantly changes his position in the vain endeavour to obtain some relief; and it may give rise, in nervous, sensitive persons, to delirium or convulsions. The vomiting empties the stomach of the last meal, and then of a large quantity of mucus. The pulse, in most cases, is not quicker than natural.

These attacks may continue for several days or, in more acute cases, for two or three hours only. Very shortly the yellow tinge of jaundice is noticed in the white of the eyes, and gradually spreads over the body. The water passed after this is very dark, the motions are

pale or slate-coloured. Jaundice, of course, only occurs when the gall-stone entirely blocks the duct which leads to the bowels, and not when it blocks that leading to the gall-bladder (see Fig. 6, p. 55). When the stone drops from the duct into the intestine, all the symptoms subside as rapidly as they began, the pain and vomiting cease, and the jaundice gradually disappears.

The gall-stones are carried along the bowel and evacuated in the motions, and it is of great importance to search these carefully by passing them through a sieve, in order to prove the nature of the attack. If the stone is not found, one cannot be sure that it has been passed, for in many attacks of colic the stones pass into the duct leading to the bowels and drop back again into the gall-bladder, in which case they may produce all the symptoms over again. There is, therefore, a great satisfaction in having your enemy safely in sight, and the search for it in the motions must be very thorough. It is not sufficient to wash them with water, for, as we have already said, gall-stones do not float when fresh: it is necessary to wash the whole of each action through the meshes of a fine sieve, and it may be necessary to do this for some days, as the stone may take some time in travelling down from the upper part of the bowel.

It might be imagined that gall-stones could be seen in the ducts and gall-bladder by X-rays, but this is impossible, as the stones, unlike those that form in the kidney, are quite transparent to these rays.

If the presence of gall-stones is proved, and yet they are not passed out of the gall-bladder, the question of operation must be considered. Of course, this is a point that only a surgeon can decide, but it must be understood that there is much danger in leaving the stones in the gall-bladder, for they cause frequent attacks of pain, and set up much surrounding inflammation, which may spread to the peritoneum. In skilful hands the operation is not one of very great danger.

We must now turn to the treatment of gall-stones, and it will be well first to discuss the treatment of the attacks of biliary colic, and, **Treatment.** secondly, that of gall-stones in general and their prevention.

First, then, when an attack of biliary colic occurs, what is to be done? Take a couple of teaspoonfuls of bicarbonate of soda, dissolve it in a pint of hot water, and drink it freely. If you have no bicarbonate of soda handy, use a dozen soda-mint tabloids. If the fluid is vomited take some more. The soda relieves the acidity of the stomach, and the hot water acts as a sedative. But in most cases morphia or opium

will be necessary. Opium may be taken in a pill (half a grain), or as tincture of opium or laudanum (15 drops); but, as vomiting is usually present, nothing is better than a hypodermic injection of a quarter of a grain of morphia. It is not advisable to give this, however, without a doctor's order, and it is always best, in attacks of gall-stone colic, to send for a doctor at once. In the meantime get a hot bath ready without delay, and put the patient in it, or make a large and thoroughly hot linseed poultice or a hot fomentation, and apply it to the seat of pain. Ether gives relief from the pain and relaxes spasm; 20 drops should be placed on a handkerchief and inhaled.

We will next consider the means by which the formation of gall-stones can be prevented.

The diet must be carefully regulated; it must be limited in quantity, and all rich, strongly flavoured and fatty foods omitted. Wine, beer, and spirits must be eschewed, but plenty of fluid must be taken, and a glassful of hot water two or three times a day between meals can be strongly recommended. The large amount of fluid helps to keep the bile thin, and carries it off more rapidly.

One of the favourite prescriptions amongst doctors for those who suffer from a tendency to gall-stones is a visit to the popular Bohemian watering-place, Carlsbad. It is here that the spa treatment is carried out with complete thoroughness. No lying late in bed is allowed, but you must be up and out by about six o'clock in the morning. Regular exercise is ordered, careful dieting is compulsory, and large quantities of mildly aperient and alkaline water are drunk. The last item in the treatment is probably the most important; many tumblerfuls of water are taken daily, in sips, for there seems to be good reason to believe that when the water is taken in sips, and on an empty stomach, it is more beneficial and acts more readily upon the liver. Many other places have similar waters, such as Marienbad, Vichy, and Homburg, and, if it is impossible to pay one of these a visit, it is possible for all to carry out the treatment at home, in a modified form, by employing the salts of these waters, which are sold as powders or tabloids by most chemists, and by observing a *régime* of careful dieting, regular exercise, and constant attention to the bowels. For the latter purpose nothing is better than a dose of some mild aperient salts, such as Carlsbad salts, or of an aperient water, such as Apenta.

The question will naturally arise whether there are no drugs which can be taken to prevent the formation of gall-stones, or to dissolve them if once formed. One popular remedy is a mixture of ether and

turpentine, 6 drops of the former with 4 drops of the latter, three times a day; these can be bought in capsules or pearls. Tabloids of 5 grains of salicylate of soda, taken three times a day for a few days at a time, are also useful, as this drug has the power of making the bile more thin and watery.

Lastly, after recovering from an attack of biliary colic, nothing can be more beneficial than a good tonic, which will stimulate the liver and strengthen the body, and the following mixture will be found excellent for this purpose:—

PRESCRIPTION 57

Dilute nitro-hydrochloric acid	.	.	.	80 drops.
Spirits of chloroform	.	.	.	80 drops.
Tincture of orange	.	.	.	2½ drachms.
Tincture of nux vomica	.	.	.	80 drops.
Water to 8 ounces.				

An eighth part to be taken 3 times a day 10 minutes before meals.

JAUNDICE

In this condition the bile has found its way into the blood instead of being carried out of the body, as it is in a healthy state. The name is derived from the French word *jaune*, yellow. How does the bile find its way into the blood? or, in other words, what are the causes of jaundice?

There are two varieties of the complaint. In one there is some definite impediment to the flow of bile along the bile-ducts into the intestines. The bile is secreted as usual by the liver, but **Causes.** it cannot escape, as in health, into the bowel, and collects in and much distends the gall-bladder and ducts of the liver, from which it is taken up into the blood in large quantities, and stains all the structures of the body, including the skin and the whites of the eyes. In the second variety there is no interference with the flow of the bile, which is formed naturally and passes into the bowel, but there it is taken up or absorbed into the blood in such quantities as to produce the yellow colour of jaundice. There is still much mystery as to how this second form of jaundice is produced. Probably it is explained by the action of the nervous system, which in some way prevents the natural processes of excretion and removal of the bile from the body.

The obstruction in cases of the first class may be produced in many ways. One of the most common is gall-stones (see above). Or obstruction may be caused by simple thickening of the bile, which

becomes too concentrated to flow. Another common cause of obstruction is swelling of the mucous membrane or lining of the ducts; a slight exposure to cold may cause catarrh of the stomach and duodenum, and the mucous membrane of these organs gets swollen and inflamed, the swelling spreads up the liver ducts and blocks them, and jaundice is a result. This is called catarrhal jaundice, and has been described in the section on Enteritis (p. 98). Obstruction of the ducts may also be the result of injury or surrounding inflammation, or of pressure caused by a tumour of a neighbouring organ, or of disease of the liver itself, especially congestion, cirrhosis, and cancer. It is not unfrequently due to the pressure of a pregnant womb.

In the jaundice which occurs without any interference with the outward flow of bile, the action of the nervous system is sometimes evident, for occasionally most severe and sudden attacks of jaundice follow some violent nervous disturbance, such as a fit of anger or intense fear. Jaundice has been caused by dread of a severe operation or the suspense and anxiety of an important examination, or the injury to the nervous system produced by severe concussion of the brain from a fall. Many poisons may have a similar effect, such as phosphorus or mercury, or the poisons of severe disease, such as yellow fever, enteric fever, or scarlet fever. Lastly, long-continued and extreme constipation has produced this complaint owing to the retention in the bowels of the stale bile, which in the ordinary course would be evacuated from the body.

From this long list of causes it is evident that it is not always easy to explain the occurrence of jaundice, and yet it is highly important to discover the cause in each case, as the treatment depends so much upon this information, and also the judgment to be formed as to the seriousness of the attack and the hopes of ultimate cure.

Jaundice is, of course, only a symptom of the various conditions we have been mentioning. It is quite easy to recognise its presence.

Symptoms. The patient is perfectly yellow, and the colour is unmistakable in skin and eyes. By artificial light the golden tint may perhaps be overlooked, but by daylight this is impossible. The greenish yellow colour present in extreme anæmia may at first sight appear similar. In anæmia, however, the eyes are not yellow, but whiter than is natural, and the symptoms now to be mentioned, which occur with jaundice, are absent in anæmia.

The urine of a jaundiced patient is always very highly coloured; it varies from a saffron yellow to a dark brown, or even black, and

it stains linen a bright yellow colour. This tint is due to the bile, which is carried off from the body chiefly in the urine. The motions, on the contrary, are wanting in colour through the absence of bile, and are pale drab or even clay coloured, and they quickly decompose, and smell offensively. In the bowel they become hard and dry, and there is extreme constipation, with flatulence and indigestion. Bile is an antiseptic, and naturally checks fermentation and decomposition. It is also a natural laxative, and stimulates the muscular movements of the bowels, and these effects are wanting when the bile is prevented from entering the bowel. As the bile permeates the whole body, other fluids besides the urine are coloured by it: the sweat becomes yellow, and stains the linen; and even the saliva, tears, and milk have been known to take up the same tint. The expression to "see things with a jaundiced eye" has some foundation in fact, for cases are recorded in which everything appeared yellow through staining of the fluids of the eye. If the jaundice is of long duration the golden yellow colour of the skin gradually grows darker and becomes olive green or even bronze coloured, but its tint varies very much from day to day according to the activity of the liver and kidneys. Cutaneous eruptions are common, and an intense itching of the skin is often set up, and proves itself the most troublesome part of the complaint. It is frequently worse at night, interferes with sleep, and wears the patient out.

When jaundice has continued for some time the body begins to waste, the pulse is very slow, the appetite fails, the patient becomes irritable and hypochondriacal.

It is impossible to say how long a case of jaundice will last, as its duration depends so much upon the cause. When this is a simple chill or a congested state of the liver, the condition will probably pass off in a few days under proper treatment. If it be caused by a gall-stone it subsides rapidly after the stone is passed. Fortunately, the less serious causes are the more common, and an average time for an attack would be about a fortnight.

There is not, as a rule, much danger, the great majority of cases ending favourably. In cases of gall-stones, catarrh, congestion of the liver, and chronic constipation, little anxiety need be felt; the attack will probably pass off satisfactorily. In cases of tumour, however, the outlook is much more serious, and the jaundice is likely to be permanent. In poisoning and in acute diseases it is often also a very serious symptom. Lastly, when it is the result of mental emotion it sometimes disappears quickly, but in many such cases there are

grounds for alarm, as the attack is often followed by severe nervous symptoms. Cases in which the discoloration of the skin is very intense are not necessarily the gravest; in many of the most serious cases the tingeing is but faint. When jaundice occurs in old people, especially those whose constitutions are impaired, a favourable recovery is less likely.

We must now turn to the treatment of this condition, and must remember that it is only a symptom of many different diseases, each of which will require distinctive treatment. **Treatment.** Attention must therefore first be directed to discovering the cause of the jaundice, but as this is often a very difficult matter, and sometimes quite impossible, we will here consider the general treatment for a case. First and foremost, the diet must be restricted. Owing to the absence of bile, which is active in the digestion of fatty foods, such foods are unsuitable, and we should, as far as possible, leave them out of the diet table altogether. There is almost always great loss of appetite, and therefore ordinary food cannot be taken. Starchy and sweet foods must be used very sparingly. As the liver is usually congested and sluggish, all alcohol should be forbidden.

Beef-tea, chicken, mutton and veal broths, with meat extracts, are all suitable. Milk may be taken freely, but should be first peptonised or diluted with soda-water. It may form the chief and, indeed, only article of food in many cases during the first few days of the attack. A few biscuits or toasted bread may be added. Later, bread and milk, Benger's food, and light milk puddings may be allowed, and then fish, chicken, and similar light foods. To relieve thirst, and as a change from milk, cold water, barley water, and toast and water may be permitted, and are often very acceptable to the patient.

In the way of drugs there is little that can be advised, but tabloids of ox-gall are sometimes recommended to take the place of the bile and aid in the digestion of the food. One tabloid should be taken twice a day immediately after food.

Hot fomentations or linseed poultices to the region of the liver are comforting, and often give relief to the pain and feeling of fulness. Friction to the same part with simple liniments is also useful. Constipation will require attention. Nothing is better than some natural mineral water, as Apenta or Hunyadi, or salts, such as Carlsbad; and an occasional dose of one grain of calomel, followed by a dose of the waters, often gives great relief. Flatulence may be benefited by creasote, two or three drops in a capsule three times a day,

or by purified charcoal in the form of a powder, lozenge, or biscuit. The intense itching of the skin can best be relieved by frequent warm baths and free friction with towels. At the beginning of the attack it is best for the patient to stay in bed and keep quiet and warm, but as it subsides he may get up and dress. He must, however, avoid all exertion of body or mind. Later, if the weather permit, he may take a little gentle outdoor exercise, but he must be very careful to avoid all risk of cold or damp, for jaundiced persons are very liable to chills.

It is possible to detect improvement in this condition by watching the stools and urine. The former begin to get darker in colour and more natural in consistence as the bile once more flows in its normal course, and the latter grows lighter in colour as the bile is carried off from the body. The low-spirited, drowsy condition gradually passes off, and the patient feels more fit for exertion and more inclined for his food, and finally there comes the time when a little change of air and scene soon sets him right, and he can return to work with renewed health. There will be need, however, for great care for some time. He must avoid much exertion and exposure to cold, and be very careful that his food is of the simplest and least irritating kind.

Although we have described pretty fully the general treatment of jaundice, sufferers would do well to consult a doctor, whose experience may very probably enable him to discover the cause of the condition, and treat the cause as well as the symptoms.

PERITONITIS

Inflammation of the peritoneum is a very serious disorder, and is not at all suited for home treatment. Medical aid must be obtained without delay. We will describe the symptoms and course of the disease as simply as possible, so that it may be recognised early and the doctor called in.

As has been described previously, the peritoneum is a thin, smooth, shiny membrane which covers all the organs of the abdomen and pelvis, and also the walls of the abdomen. It forms the internal coat of the organs it covers, and is liable to be involved in all their diseases. Inflammation is the most common of its affections, and is met with in two chief forms—acute and chronic.

Acute peritonitis may occasionally be the result of exposure to cold, and is then most commonly met with in young women, as the result

of getting the body or feet wet and cold at certain periods. The most common cause is, however, injury, including surgical operations, and spread of inflammation from neighbouring parts.

Causes.

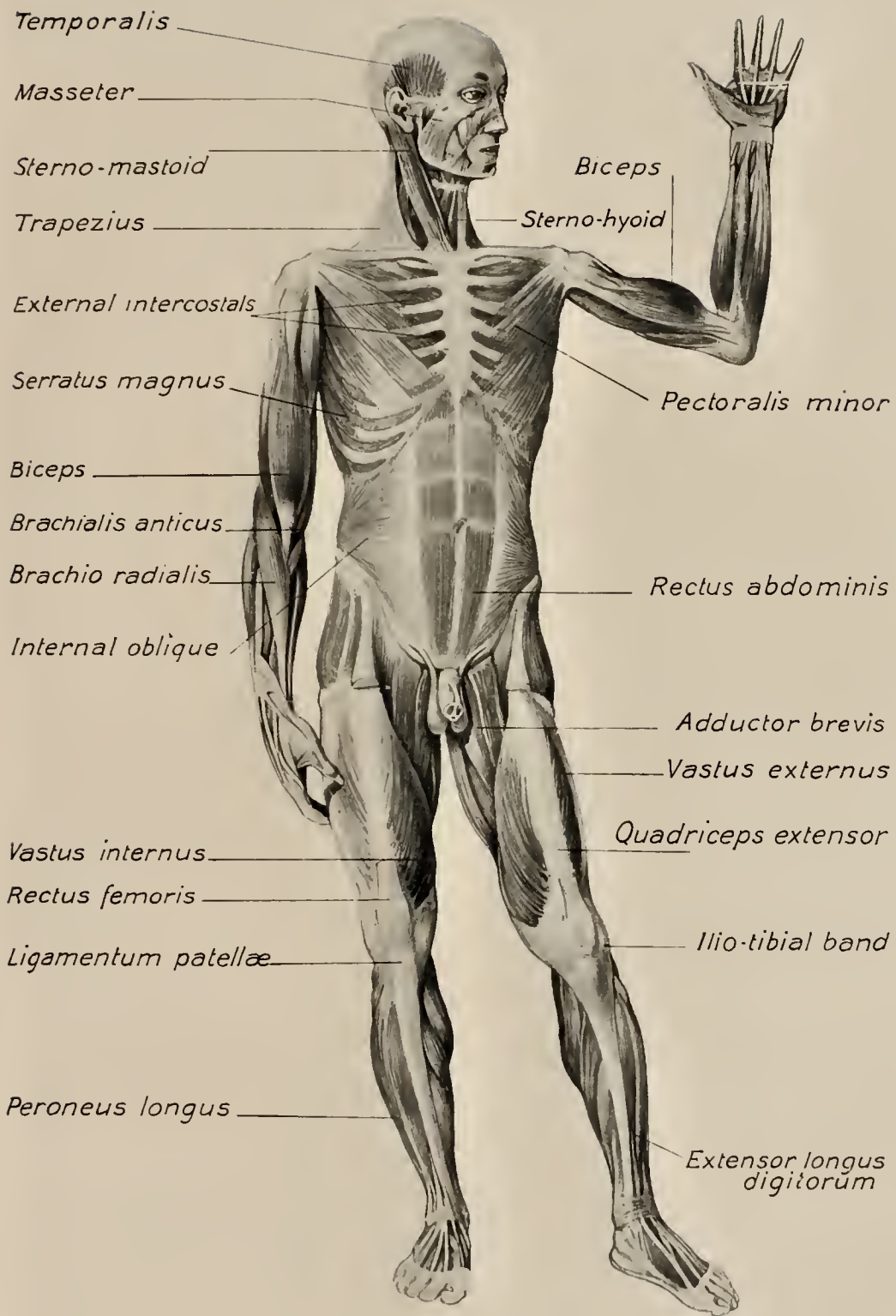
Although occasionally a very slight injury to the peritoneum—such as the prick of a long pin or a fine knife—may set up the most violent and fatal inflammation, yet it can be freely opened, divided, and handled by a surgeon without any appreciable harm resulting. This apparent anomaly is explained by our knowledge of germs, for if the wound, however extensive, is made by a surgically clean (or, as it is called, aseptic) instrument, no harm results, whilst the merest prick with a surgically dirty and germ-carrying pin will produce fatal inflammation.

The diseases of other organs which by extension may produce peritonitis are so many that we can only mention some of those most frequently met with. Ulcers of the digestive organs, especially ulcers of the stomach, if they eat deeply enough, may reach the peritoneum, and may perforate it; the food then passes into its cavity, setting up a rapidly fatal inflammation—peritonitis from perforation. A rupture of long standing, and apparently quite harmless, may suddenly become nipped or strangulated by the surrounding parts, when acute peritonitis supervenes. Inflammation of the womb in connection with childbirth may extend to the peritoneum and produce puerperal peritonitis. The bowels may be irritated by their contents, and inflammation be set up, which, spreading through all their coats, causes acute peritonitis, or, as it is sometimes popularly called, “inflammation of the bowels.” These examples will suffice to show how this disease is likely to arise.

The symptoms usually come on suddenly and increase rapidly. At first it is difficult to distinguish them from those of an attack of colic or severe stomach-ache. The pain is very severe, and is

Symptoms.

at first usually limited to some particular spot, which differs according to the cause, but it rapidly spreads over the whole abdomen. Unlike the pain of colic, which is usually relieved by pressure, the pain of peritonitis is much increased by it; the patient cannot bear the slightest touch, and even the weight of the bedclothes is unendurable. To relieve internal pressure, the sufferer lies on his back with his legs bent up to his body and his shoulders drawn forward. He breathes also in quick, short, shallow gasps, so as to avoid pressure from the breathing movements, using his chest and not his abdomen for the purpose; the breaths are increased from the natural 17 or 18 a minute to as many as 40, and the pulse is frequent (perhaps 120 a



DEEP VIEW OF MUSCLES, FROM THE FRONT.

minute), and very small and weak. Usually the temperature is raised, the appetite is lost, the tongue may be furred, but is more often bright red and dry, and sickness sets in and is frequently constant and uncontrollable, everything taken being rejected immediately. The abdomen gradually gets distended, at first with wind, and later with fluid, which is poured out from the inflamed peritoneum. The disease may end fatally in a few days, but it is not by any means hopeless, and many cases recover under proper treatment.

The patient must be put to bed at once, and some appliance arranged to keep off the pressure of the bedclothes. The very smallest quantities

Treatment. of nourishment must be allowed, only spoonfuls of iced milk, beef-tea, or barley-water to relieve the thirst; indeed, it is often necessary to give all food by enema. Hot fomentations or light poultices should be applied to the abdomen, and will relieve the pain; they should have laudanum or tincture of belladonna sprinkled freely on them. Sometimes the application of a dozen leeches helps to allay the inflammation. Opium or morphia is the one drug which is of use. A 1-grain opium pill or $\frac{1}{4}$ -grain morphia injection under the skin should be given, and repeated sufficiently often to keep the patient out of acute pain. Alcoholic stimulants may be required.

Chronic peritonitis may occur in two forms, either simple inflammation or tubercular. The former is most commonly a result of an acute attack which has been imperfectly cured, whilst the latter occurs in those who have a tubercular tendency. They must both be treated by counter-irritation to the abdomen—painting it with iodine, or even croton-oil—and by supporting the strength with good nutritious food, tonics, especially iron and cod-liver oil, and change of air.

It may be added that all forms of peritonitis are fast passing into the realm of surgery. Many cases have recovered after operation, and in some no other form of treatment holds out any hope.

DISORDERS OF THE PANCREAS

The only other organ connected with digestion the disorders of which we have not mentioned is the *pancreas*. This is often involved in such diseases as inflammation and cancer, but the symptoms produced by affections of the pancreas are at present too indefinite for discussion here. Light, however, seems to be dawning on the subject, and before long these maladies may be as clearly understood as so many others.

CHAPTER VII

THE URINARY ORGANS AND THE URINE

Kidneys—Ureters—Bladder—Urine—Tests for Urine—Its Composition—Urates—Phosphates—Uric Acid—Quantity of Urine—Colour—Specific Gravity—Blood in the Urine: Hæmaturia—Sugar—Albumen—Mucus—Pus—Bile.

THE urinary organs are (1) the kidneys, which separate the urine from the blood; (2) the ureters, which convey it to the bladder; (3) the bladder, in which it accumulates; and (4) the urethra, the tube along which it passes to be discharged from the body.

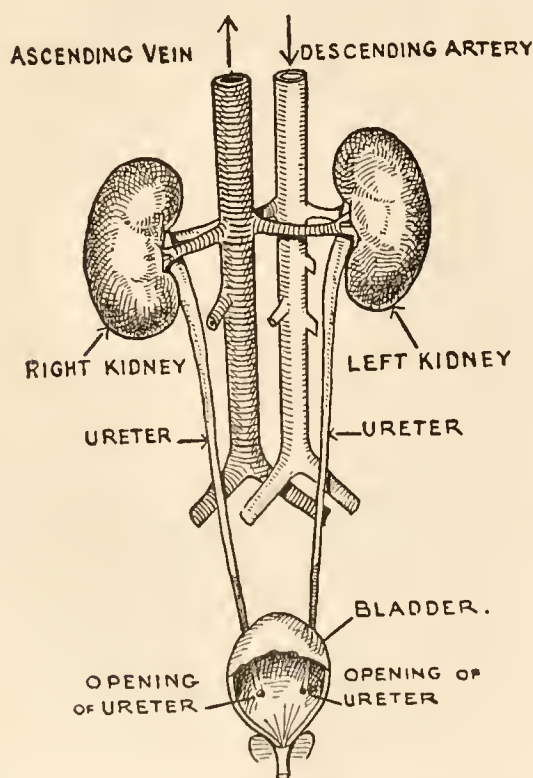


Fig. II.—KIDNEYS, URETERS, AND BLADDER.

The kidneys are two solid organs or glands which produce the urine. They are situated in the loins, one on each side of the spine, and close to it (Fig. 12); their upper part is protected by the lower ribs and the lower part by the large muscles of the loin, and they lie imbedded in a mass of fat. Each kidney weighs about a quarter of a pound, and the organ is rather smaller in women than in men. The left is longer and narrower than the right, and placed a little higher up. The substance of the kidneys is dense, of a deep red colour, and very easily torn; it is contained in a firm fibrous coat or sheath, called the capsule.

Situated on the upper end of the kidneys are two flattened glands,

the suprarenal capsules or bodies. Each of these weighs about a quarter of an ounce, and their use is very obscure, but they apparently have no connection with the formation of the urine, and are here described merely because of their close connection with the kidneys.

Suprarenal capsules.

The ureter is at its upper part attached to the kidney, and here it

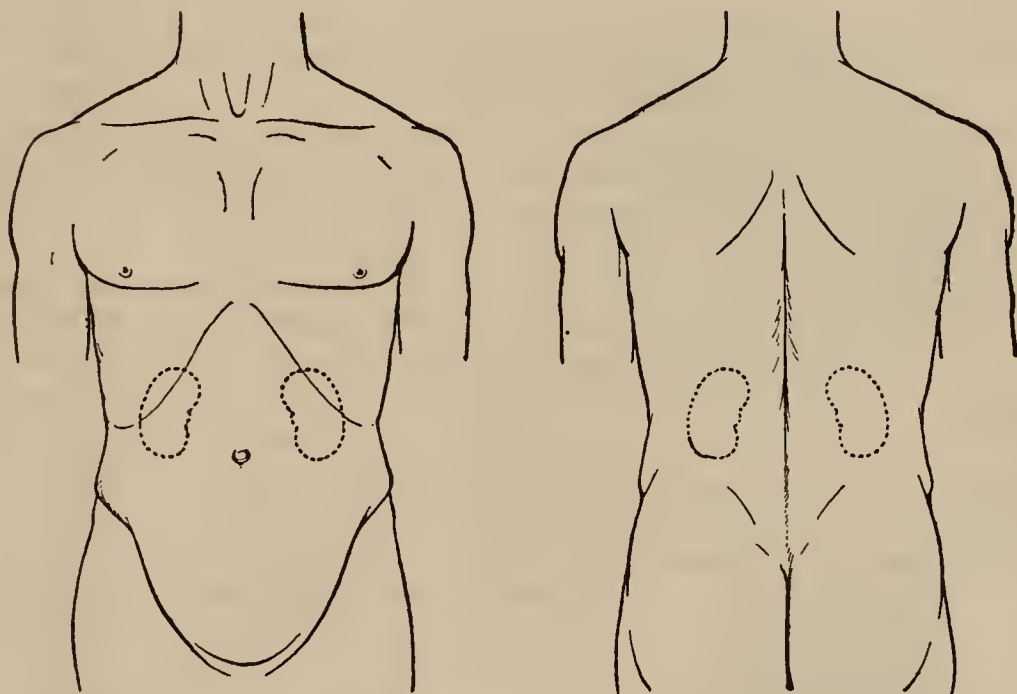


Fig. 12.—POSITION OF THE KIDNEYS, FROM THE FRONT AND FROM BEHIND.

swells out to form a funnel-shaped sac, which is called the pelvis of the kidney (Fig. 13). As it descends to the bladder it becomes narrower, its ordinary width being about that of a goose-quill, and its length from 14 in. to 16 in.

Ureters.

The urinary bladder is a distensible bag for the reception of the urine, with walls containing much muscular fibre (Fig. 14). When moderately

Bladder.

distended it will hold about a pint, but it is capable of containing much more, and as a result of extreme distension, due to disease, has been known to hold as much as 20 pints under pressure. It is commonly considered to be larger in women than in men, but probably the large bladders which are not infrequent in women are due to over-distension, and their natural capacity is

slightly less than in males. By forcible contraction of its muscular walls, aided by other muscles of the body, the bladder can be completely emptied through the urethra. The whole of the interior of the bladder is lined with mucous membrane, continuous with the lining of the ureters and of the urethra; this is loosely attached, and is thrown into wrinkles when the bladder is empty, disappearing when it is distended.

At the lowest part of the bladder, close to the opening of the urethra, is a triangular space, where the mucous membrane is tightly stretched and is much more acutely sensitive; as the urine accumulates, its pressure on this part produces a feeling of fulness and of necessity for relief. This occurs involuntarily in young children, but with age the will obtains control over the muscles which guard the orifice, and the urine can be retained or expelled at will.

Close to this part, the neck of the bladder, in men, and surrounding the urethra, is situated the prostate gland, formed of glandular and muscular structures, and resembling a chestnut both in size and shape. At the back it lies in contact with the bowel. Although closely connected with the urinary organs, it has nothing in common with their functions, but forms a secretion which is discharged into the urethra.

Prostate gland.

The action of the kidney is controlled by the nervous system through a complicated mechanism by which the varying needs of the body are attended to. The process by which the urine is formed is of two kinds: the watery part of this fluid simply passes through the kidney apparatus as through a filter, and there are little globular bodies, called Malpighian corpuscles, which carry out this duty. The fluid from these passes along little tubes into which the various organic constituents of the urine are secreted, and washes them along to the pelvis of the kidney, from which they are transmitted along the ureter to the bladder.

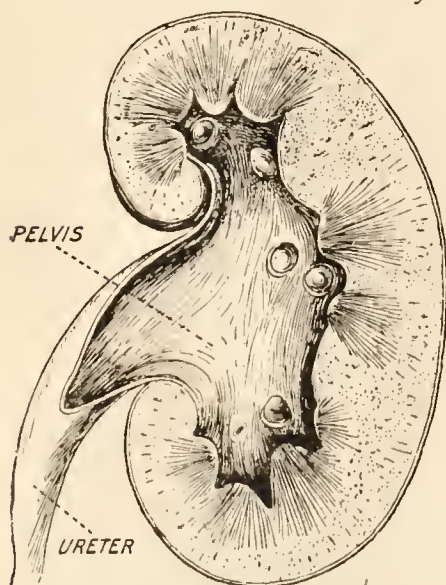


Fig. 13.—SECTION OF A KIDNEY, SHOWING THE PELVIS.

In a healthy individual about 50 ounces, or $2\frac{1}{2}$ pints, of urine are secreted in the twenty-four hours, but the quantity varies very much,

according to circumstances. In hot weather, when the skin is freely carrying off water from the body in the form of sweat, it is diminished,

Urine. whilst under the influence of cold, or when large quantities of fluid are being taken, it is much increased. This

applies almost entirely to the watery part of the urine, for the amount of solids excreted remains very uniform whilst the body is healthy. When the fluid part of the urine is diminished it becomes more concentrated and highly charged with solid constituents and colouring matter, whilst when it is increased the urine approximates more to plain water.

Healthy urine is a clear, amber-coloured fluid with a saltish taste and slightly aromatic odour. As it is passed it has an acid reaction, but it rapidly becomes alkaline, and smells offensively.

The tests to show the reaction of urine are so simple, and yet so useful, that they may easily be carried out by an unprofessional person.

Tests for Urine. Strips of paper coloured with litmus, in red and blue, are sold for the purpose. If the blue papers are turned red by the urine it is acid, which is its normal condition; if the red papers are turned blue it is alkaline, which is abnormal, and is usually caused by decomposition. Fresh urine should be employed for this examination, for a reason which we shall now proceed to give.

In ordinary circumstances urine should be acid, and this acidity should only vary in degree as a result of food and drink; but if it is found to be alkaline—that is, if it turns red litmus-paper blue—something is wrong, and this something is, in the great majority of cases, inflammation of the bladder. But—and this *but* is of great importance—we must be sure that the experiment has been properly carried out. The urine must be quite freshly passed, for it rapidly becomes alkaline. This change is due to decomposition; bacteria and dirt act upon the urea in the urine, and turn it into ammonia, which is a strongly alkaline substance. If, therefore, the urine has stood for some time in a clean vessel, or even a short time in a dirty one, the fact of its being alkaline

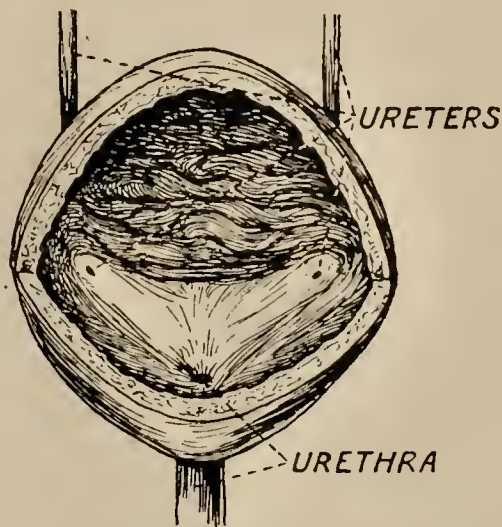


Fig. 14.—SECTION OF BLADDER

is of no importance at all, and certainly does not show that anything is wrong with the bladder.

The specific gravity of urine—that is, its relative weight compared with that of pure water—is tested by means of an instrument called a urinometer; this consists of a glass bulb which is weighted to the required extent with mercury, and carries at its upper end a long stem on which a scale is marked. If the urinometer is floated in pure water it sinks until the surface of the water corresponds with the point of the scale marked 0, but if it is floated in urine it does not sink so low, but comes to rest when the level of the urine is somewhere between 15 and 25. Now the specific gravity of water is employed as a standard, and is 1,000, and the specific gravity of normal urine is from 1,015 to 1,025.

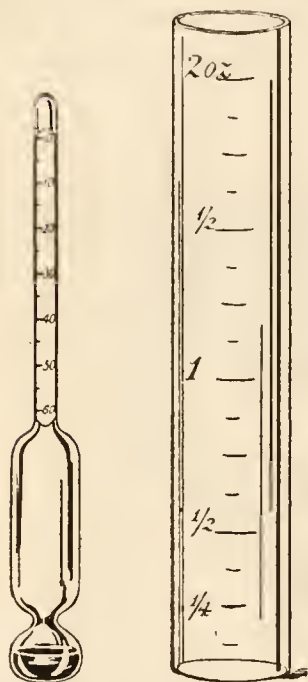


Fig. 15.—URINOMETER AND TEST-GLASS.

In every 100 parts of normal urine 96 are water, whilst the remaining 4 parts consist of small quantities of many solid substances in solution. As the normal quantity of urine per diem is 50 ounces, the normal quantity of solids is 2

Composition of Urine.

ounces. These solids consist of urea (about 1 ounce), common salt, phosphates, sulphates and other salts, and colouring matter.

The urea is a nitrogenous substance, and is the waste material of the body produced by the various chemical changes which take place.

Urea. Its amount is very much increased by excessive exercise, and in all conditions accompanied by fever. It depends, too, on the kind of food which is eaten, being greater with animal than with vegetable food. The colouring matter is derived from the blood, and its amount varies considerably even in health, according to the proportion of water contained in the urine. As a rule, when the urine is freshly discharged all the salts are in solution, and after standing for a short time only a slight cloudy settlement is seen, due to mucus from the urinary passages.

But very frequently, after the water has had time to get cold, a sediment forms of a pale pink or brick-dust colour. This is due to salts called urates, or lithates, which are soluble at the temperature of the body. They disappear again at once if the urine is heated. In birds

and reptiles the urine is solid, and is composed almost entirely of these salts. The occasional presence of urates in the urine is nothing

Urates. to be alarmed about, for they will appear in the water of persons in the best of health when they have had to make violent exertion or have dined well; but if they become a very frequent feature of the urine, the cause to which they are due should be sought and remedied. They may be a sign that the liver is acting imperfectly; they also are common in the case of persons who over-indulge in rich or indigestible foods or drinks, and those who are of gouty constitutions. They are almost always present in feverish complaints. To remove the tendency to this condition it is necessary to adopt a plainer diet, to stimulate the liver with mild aperients, and to take more fluid to drink.

Another deposit which is sometimes seen in urine is of a paler colour than urates, and may be almost white; it is caused by phosphates.

Phosphates. These salts are always present in healthy urine, but as long as it remains acid they are kept in solution. If, however, the urine becomes alkaline or very faintly acid, they settle down as a deposit. If the urine is acid when passed, and becomes alkaline afterwards, the deposit of phosphates is of no importance whatever. If the urine is alkaline or very faintly acid when passed, it is a matter of more importance. It signifies a state of general debility or some affection of the bladder, such as inflammation of its lining membrane (cystitis), and treatment should be directed to these conditions.

To distinguish urates from phosphates a simple test is applied. The urine is boiled, and while this dissolves the urates the phosphates increase, and the urine grows thicker. If a few drops of nitric or acetic acid are added to the hot urine, the phosphates will be found to dissolve immediately.

Another deposit which occurs in small quantities in normal urine is uric acid. In appearance it much resembles grains of cayenne

Uric Acid. pepper. In small quantities it is of no importance, but if it continues for any length of time, or occurs in large quantities, it is a matter that requires serious attention. It is the acid of gout, and may be a forerunner of an attack of that painful complaint. It is also met with in unhealthy states of the liver, in diabetes, and in various feverish complaints. If neglected it is liable to be deposited in the kidneys or in the bladder and form a stone (calculus).

VARIATIONS IN URINE

The amount of urine varies a good deal even in health, but averages about 50 ounces a day, more being passed in the daytime than at night.

Quantity. If a person has to rise two or three times in the night to pass water, the fact should immediately arouse suspicion that there may be something wrong with the kidneys. An increase in the amount of urine which continues persistently occurs in diabetes, in polyuria, and in some forms of kidney disease, whilst a greatly diminished quantity occurs in other affections of that organ.

Urine, even in health, may be almost colourless, like water, or may be dark brown. The absence of colour is often the result of its being very dilute, as after copious draughts of water, or when it is secreted very rapidly, as after exposure to cold. It is a sign also of such diseases as the gouty kidney, anæmia, or diabetes. In certain nervous states, too, as while a person is sitting for an examination or awaiting a surgical operation, very clear urine is passed; in such conditions the urine is passed with great frequency, and is almost as clear as water, with a specific gravity as low as 1,005. Hysteria is another condition in which large quantities of pale urine are evacuated.

High-coloured urine is met with after copious perspiration, in diseases of the liver, and in fevers, and it may occur after a large meal even in healthy persons. The dark colour may indicate the presence in the urine of bile or blood, or may be due to drugs. Rhubarb, senna, santonin, and creasote all have this effect, and in cases of poisoning with carbolic acid the urine becomes green or almost black.

The specific gravity of urine varies according to the amount of solids it contains; the more of these, the higher, of course, the specific gravity. It is raised by perspiration and lowered by drinking freely, by cold, or by mental excitement. It is lowered during fasting and increased after meals. The average specific gravity, therefore, is obtained by collecting all the water passed in twenty-four hours and taking a sample of it for examination. This would be the best way to collect a specimen for the doctor to analyse, but as this is rather a troublesome matter it suffices to keep a specimen of the water passed in the evening and another of that passed on rising in the morning, the latter being the more trustworthy of the two, as there is less likelihood of alterations from transitory circumstances. If the specific gravity of the urine is found to differ from the normal in either direction in a single specimen,

it does not necessarily mean anything of importance, but if there is a persistent variation from the normal—if for several days it is below 1,015 or above 1,025—it would be well to have it examined by a doctor.

A very low specific gravity is met with in certain diseases of the kidney—particularly in the gouty kidney—and in hysteria. A high specific gravity occurs in diabetes owing to the presence of sugar, in which disease it may rise to 1,040, 1,050, and even higher. It also occurs in acute inflammation of the kidneys and in feverish complaints, when the urine is also diminished in quantity.

These remarks are not at all intended to encourage persons to be constantly testing their own urine. But illness may occur when no skilled advice can be obtained, or symptoms may excite alarm of kidney disease, and these simple experiments may prove its non-existence and set the mind at rest. It must be fully understood that a single observation of the specific gravity is of no great value, owing to the constant variations due to unimportant circumstances.

The presence of blood in the urine is known as *hæmaturia*. When the blood is in large quantity its presence is easily recognised; there may be sufficient to give the urine the ordinary colour of blood, or even, after it has been passed, to fill it with a large blood-clot; but when the hæmorrhage is but slight there is a good deal of uncertainty amongst the unskilled in deciding if there is any blood at all. The water has merely a thick and smoky appearance or a faint pink hue, and is described as looking like beef-tea. It is well to remember that blood may become mixed with the urine and not come from the urinary organs at all, especially in women, for with them it may even come from piles as the result of straining in passing water, and cause a great deal of anxiety without any reason.

To make sure that blood is present by simple tests is not easy when it comes only in small quantities. There is always albumen in the urine, for albumen is part of the blood; but conclusively to prove the presence of blood a microscope is required, and the small disc-like blood-cells can then be discovered. Unfortunately, those cases in which the blood is intimately mixed with the urine, and difficult to recognise, are quite as serious as those in which it is free, and apparent to the naked eye.

In genuine hæmaturia the blood may come from any part of the urinary organs, more particularly the kidneys and bladder, and before attempting to treat the condition some definite opinion as to its source must be formed. To do this, careful observation should be made,

**Blood in
the Urine.**

during the act of passing water, as to the time at which the blood appears. If the blood is thoroughly mixed with the urine it almost certainly comes from the kidneys. If it occurs at the very beginning of the act of micturition, and is bright-coloured or is in the form of long clots, it proceeds from the urethra. If first there is ordinary urine and then a flow of bright blood, the bladder or perhaps the prostate gland must be looked upon as the seat of the hæmorrhage. Hæmaturia is a serious matter, and if it is not due to the passage of an instrument, and continues for any length of time, medical advice should at once be sought.

Inflammation of any part of the urinary organs may give rise to hæmorrhage, especially if it is accompanied by ulceration. The presence of a stone also will produce it, and so will cancer and other tumours. It is one of the symptoms of acute Bright's disease, and of such constitutional conditions as scurvy or purpura. Sometimes, though rarely, it occurs in this country as the result of infection with a parasite which is common in Egypt and Mauritius (see Tropical Diseases). But some cases of profuse hæmaturia have been known to result from nervous strain or excitement only.

If the loss of blood is severe, or the cause cannot be recognised, we must do our best to treat the symptom. The patient must at once go to bed and keep perfectly quiet and as cool as possible, avoiding the warmth of many bedclothes. Cold should be applied to the part from which the blood is supposed to come—if the bladder is suspected, to the lower part of the belly, and for kidney hæmorrhage to the loins. This can be done by means of towels wrung out of cold water, by pieces of ice, or by an indiarubber bag filled with broken-up ice. The bowels should be well cleared by some rapidly acting aperient, and one of these drugs, in a tablespoonful of water, administered, viz. gallic acid 10 grains, tincture of digitalis 10 drops, or liquid extract of ergot 1 drachm, and the dose may be repeated in an hour if necessary. In the meantime send for a doctor, as it may be necessary to remove the cause of the bleeding by an operation, or to empty the bladder of blood-clots, which are likely to form in it when the hæmorrhage is severe.

In rare instances sugar may be present in the urine after a full meal of starchy or sweet food, but it will rapidly pass away, and is of no importance. When, however, sugar is present for any length of time, and in large quantities, it is a symptom of the serious complaint called diabetes. In diabetes the urine is

exceptionally clear, and has an unusual greenish tint. There is a peculiar sweetish odour, and enormous quantities are passed in the course of the day (see Diabetes, p. 156).

Albumen is sometimes found in the urine. In this case the specific gravity is almost always lower than natural, the urine is secreted in

Albumen. larger quantity, and it becomes frothy when shaken. If a small quantity is taken in a glass test-tube and boiled, the fluid, previously perfectly clear and transparent, will become thick and cloudy, and the cloudiness is not dispelled by the addition of a few drops of nitric acid, as it would be were it caused simply by phosphates. When the presence of albumen is not an indication of disease, but is produced by the consumption of too much animal food, it is quite transient. If it persists it is a symptom of inflammation of the kidneys, Bright's disease, and the explanation of its presence is that the fluid portion of the blood has escaped through a damaged kidney. This is a serious matter, as it produces wasting of the body from the loss of nutrient material, and treatment must be carried out without delay (see Bright's Disease, p. 164).

Mucus may be almost looked upon as a natural ingredient of urine. In small quantities it is constantly being given off from the lining

Mucus. membrane of the urinary passages, when it forms the faint cloudiness which is so frequently seen in urine and which settles down after the urine has stood for a while. Some people who are over-sensitive about their health may be alarmed by this phenomenon, but it is not a sign of anything wrong. If, however, the membrane of the urinary passages becomes inflamed, mucus is formed in very large quantities, passes in thick, stringy masses, makes the urine very thick, and rapidly sets up decomposition, so that the urine becomes offensive in quite a short time after it is passed. The disease in which this condition is most marked is inflammation of the bladder (p. 169).

Matter, or pus, may also be found in urine in inflammatory conditions of the urinary passages, usually mixed with mucus. When

Pus. the water has stood for a time, three distinct zones or layers become evident—clear urine at the top, thickened, cloudy urine containing mucus in the middle, and a yellow or greenish sediment of matter at the bottom. These conditions will receive further notice in the section on Cystitis (p. 169).

In cases of jaundice bile is mixed with the urine. (See section on Jaundice, p. 139.)

CHAPTER VIII

DISORDERS OF THE URINARY ORGANS

Diabetes Mellitus—Diabetes Insipidus—Uræmia—Movable Kidney—Inflammation of the Kidneys, Acute and Chronic—Inflammation of the Bladder—Irritability of the Bladder—Incontinence of Urine—Retention of Urine—Suppression of Urine—Diseases of the Prostate Gland—Gravel and Stone—Dropsy—Addison's Disease.

DIABETES

THIS is a disease which most of us know by name, but which even the best informed of us confess to knowing very little about. The name diabetes, derived from the Greek, means "a flowing through," and it is so called because one of its most marked symptoms is the loss of sugar from the body, which "flows through" the kidneys and appears in the urine. It is called diabetes mellitus (from the Greek *mellita*, a bee) to distinguish it from diabetes insipidus (see p. 163), in which no sugar is present.

In ordinary conditions of health no sugar is present in the urine, and if it is found there we look upon it as abnormal. But it is not every case in which we find sugar in the urine that we call diabetes, for it is met with in many other diseases temporarily, but without the other important symptoms which, all put together, make diabetes. The temporary presence of sugar in the urine is called *glycosuria*, which means "sweet urine," and is not a serious condition. It may occur as the result of some dietetic error, as after a meal containing large quantities of sugar or starch. If, however, sugar is present in the urine day after day, it is a matter of serious import.

The cause of diabetes is one of the important points on which we have to plead ignorance. It is *not* a disease of the kidneys: of this we are certain. The sugar is formed in some
Cause. way in the body, circulates in the blood, is filtered out by the kidneys, and is carried off in the urine. How, then, does it find its way into the blood? When describing the liver and

its functions we found that all the sugar and starch which is taken in the food is dissolved in the stomach and intestines, and carried by the blood to the liver. Here a sort of chemical laboratory exists, and all the soluble sugar is converted into an insoluble substance called glycogen, which is stored up in the liver substance and given out again gradually as the general system requires it. If the liver does not perform this duty, or does so imperfectly, the sugar passes right through it into the general circulation, is carried by the blood to the kidneys, and excreted in the urine. This may therefore be a cause of diabetes, but why the liver thus neglects its duties is unknown: at this point our knowledge ceases. We imagine that it is the nervous system that is at fault, for in many cases the producing causes have evidently acted through it, and it has been proved by experiment that by irritating artificially a certain part of the nervous system diabetes can be produced. Another organ which has been suspected as a cause of diabetes is the pancreas. But we need not pursue this subject farther, as there is nothing certainly known.

Diabetes occurs much more frequently amongst men than women, and is a disease of middle age. It certainly sometimes occurs in young persons, and is then acknowledged to be far more serious. There is a strong hereditary tendency, and this is peculiar, for it goes with an inheritance of nervous diseases such as epilepsy and mental diseases, and in this way points to a nervous origin for the complaint. The two most prominent direct causes are (1) some brain trouble, such as a tumour or other disease, or an injury, and (2) mental emotions. Any long-continued or excessive mental strain may be followed by an attack, such as continuous anxiety, from business worries, a long law-suit, or pecuniary difficulties, a lasting grief, nursing a friend through a long illness, or long-continued excitement and depression of a dissipated life. It may be produced also by certain errors of diet, such as excessive use of starchy or sugary food, over-indulgence in alcohol, or even exposure to cold and wet. Many cases occur, however, in which no definite cause can be discovered.

The symptoms come on gradually, and may long go unnoticed. The first thing which usually attracts attention is the large amount of water that is passed. With this there is an excessive thirst, which cannot be satisfied by even enormous quantities of fluid. The appetite becomes voracious, and yet, in spite of the amount of food eaten, the body grows rapidly thinner and the strength fails daily. The urine has a singular odour, like that of

apples or new-mown grass, and if a drop of it falls on the carpet or elsewhere, it leaves a white spot on drying. If the urine is examined, its specific gravity is found to be raised to 1,030, or even to 1,070, according to the amount of sugar present. The quantity passed may be as much as 30 pints, or even more, in the twenty-four hours. It is free from albumen, and is of a pale greenish colour. Whilst the kidneys act with excessive freedom, the skin hardly acts at all; it becomes dry and harsh, and is very liable to eruptions and boils. The bowels are very constipated, and the motions hard and dry. The mouth and tongue are parched and sticky, and the breath gives off a peculiar sweet odour. The disease continues to progress, and the patient to lose ground, unless suitable treatment is adopted, and a fatal issue may result from some complication or accident. Many cases end by the patient becoming exhausted and dying from inanition, others by the onset of unconsciousness or coma, whilst the majority terminate with lung complications, such as slowly progressive consumption or acute pneumonia.

The treatment of diabetes is of great importance, for although we can hardly look upon the disease as curable, a great deal can be done to mitigate the symptoms and prolong life. In many instances, indeed, the patient can continue to enjoy very fair health for many years, so long as the necessary dietetic rules are carefully adhered to, but, in most cases, immediately these are relaxed and he allows himself a little indulgence or relaxation, the symptoms return, often with increased severity.

The attention, therefore, has to be almost entirely directed to rules of diet, and in order to carry these out intelligently it is well to recall the essential point that the symptoms of diabetes are chiefly produced by the presence of sugar in the blood, and that most of the complications are due to the irritating effect of this sugar on the structures of the body. Our aim must be to prevent the entrance of sugar into the body. Theoretically, therefore, we ought absolutely to forbid all food containing sugar, or starch, which is converted into sugar—that is, all carbo-hydrates; but in practice this is found to be almost impossible, and, indeed, hardly advisable, for by the sudden withdrawal of all these articles, serious symptoms may be developed, and the patient put to much suffering and unnecessary privation. The better plan is gradually to cut off the unsuitable articles until the diet becomes really restricted, whilst a careful watch is kept on the amount of sugar in the urine. When this ingredient ceases to

Diet.

be present the strictness of diet may be very gradually relaxed, a little carbo-hydrate food being added to it. The diet should be so adjusted as to contain just so much carbo-hydrate as will not cause the appearance of sugar in the urine, and such diet should be continued so long as the patient's weight and condition remain satisfactory. The staff of life must be excluded: the patient must not eat bread, biscuits, flour, or any of the farinaceous foods, nor any of the white or starch-containing parts of vegetables. But this does not by any means involve starvation, for it leaves all the green or starch-free vegetables, and practically all animal foods—flesh, fish, fowl, eggs, cheese, cream, and butter. It is well known that life and strength may be sustained on a purely animal diet, for the inhabitants of Arctic regions subsist exclusively for, at any rate, long periods on the flesh and blubber of seals, with fish and any other animals they may capture; and the fur-hunters of British America, who are extremely vigorous and muscular men, live for many consecutive months on flesh alone. The only articles derived from the animal kingdom which are unsuitable are honey and liver. Milk is sometimes forbidden because it contains sugar, but this is a disputed point. It is undoubtedly useful in some cases and harmful in others, and its value can only be determined by experiment in each case.

A good substitute for bread can hardly be said to have yet been discovered, but there are many articles which may be employed in rotation, as gluten bread or rolls, bran bread, almond rusks and biscuits, cocoanut biscuits, diabetic rusks, soya loaves, and casoid meal bread. Small quantities of potato are also allowed, and are much less injurious than bread. All fresh fruits must be used with caution, as they contain sugar, but if cooked when green and unripe they may be eaten without fear.

In the matter of drinks there is much greater liberty. They may be taken freely so long as they do not contain sugar. Water may be taken freely, milk with the proviso already mentioned; tea and coffee are harmless, and so, too, is cocoa if made from the nibs or specially prepared free from sugar. A fresh egg beaten up in tea or coffee may be taken instead of milk, and cream and soda-water make an agreeable drink, as also does cold tea with slices of lemon. Relief from thirst may be found in rinsing the mouth with iced water, sucking ice, or sipping water containing 20 to 30 drops of phosphoric acid to the ounce, or by drinking effervescent or mineral waters. Great moderation must be exercised in alcoholic drinks—claret, hock, dry Sauterne,

Chablis, and Burgundy being the best. Brandy and whisky are suitable if necessary, and the latter can be obtained quite sugar-free. Fortunately for those to whom sugar is an indispensable luxury, a good substitute is provided in saccharin, which is some hundreds of times sweeter than sugar, and there are other substances also which are sweet without being sugary.

We will now turn from diet to the medicinal treatment of diabetes. The drug most used in England is opium, or, by preference, one of its derivatives called codeia, which has less tendency to cause drowsiness and constipation than opium. This is taken in pill form, commencing with half a grain and gradually increasing the dose to 2 or 3 grains, three times daily. In France it is more usual to use antipyrin in diabetes, a 5-grain tablet or cachet being taken three times a day. It is supposed to act through the nervous system, but, if long continued, may cause heart depression. Another drug which is sometimes employed is nitrate of uranium, one grain in a tablespoonful of water three times a day after meals; this must be given with caution. Aspirin, in 5-grain tablets three times a day, has been known to reduce the amount of sugar in the urine. A safer drug than these is bicarbonate of soda, which may be taken either by itself (15 grains in a wineglassful of water three times a day), in some alkaline natural water, or in a mixture with tincture of opium, as follows:—

PRESCRIPTION 58

Bicarbonate of soda	.	.	.	2	drachms.
Tincture of opium	.	.	.	80	drops.
Tincture of orange	.	.	.	2½	drachms.
Chloroform water to 8 ounces.					

An eighth part to be taken 3 times a day.

Bicarbonate of soda plays an important part in the treatment of diabetes at health resorts, as it is contained in large quantities in the mineral waters usually employed. This is the usual mode of treatment in Germany and Austria. Many springs which contain alkaline and alkaline-saline waters are suitable, but we need only mention two, namely, Vichy and Carlsbad. The waters at the latter place have a considerable reputation in diabetes. The patient is put on a restricted diet, and takes two or three tumblerfuls of the water daily, and the thirst and excessive amount of urine often diminish by the fourth or fifth day, and by the second week of treatment the urine may be free from sugar. The whole course lasts from four to five weeks. Diabetic

patients are peculiarly liable to chills, which are very dangerous. They must therefore take all necessary measures to avoid them, must dress warmly, live, as far as possible, in an equable climate, and never winter in England if it is possible to go abroad. They should take regular gentle exercise, and avoid fatigue or anything that exhausts their strength. The action of the skin, which is always sluggish, may be encouraged by a warm bath taken perhaps twice a week, or a vapour bath, such as the Russian or Turkish bath, taken less frequently.

The first test for sugar is with the urinometer, a little instrument which can be bought at any chemist's (p. 150). By this the specific gravity is taken, and if it is found to be high we must suspect the presence of sugar. To prove its presence we use a special preparation, Fehling's solution. As this keeps badly it is usually sold in two bottles, one containing copper, and the other solution of potash. An equal quantity of these solutions should be mixed together in a test-tube, when they make a beautiful dark blue liquid, which should be boiled. To this hot liquid add the suspected urine a few drops at a time, and boil again. If sugar is present in the urine a red or orange-coloured cloud forms.

This shows the presence of sugar, but not its amount. To find the amount, which is really the important matter in watching a case of diabetes, we must again make use of the urinometer. The test consists of a very pretty and interesting experiment, for which we shall require two glasses long enough to receive the urinometer, and a pennyworth of dry German yeast, which can be purchased at any baker's. The two glasses should be nearly filled with some of the urine, and the specific gravity of both taken: we will consider this to be 1,040. Now put a pinch of yeast into one, and keep the other as a standard for comparison; cover them both up, and put them to stand for twenty-four hours in a warm place—the mantelpiece will do. At the end of this time take the specific gravity of both specimens again, and you will find that the specimen in which you put the yeast has a much lower specific gravity than the standard one: the specific gravity will be perhaps 1,010. This is because the sugar, which caused the high specific gravity, has been destroyed by the yeast, and in its place have been formed alcohol, which is lighter than water, and carbonic acid, which has escaped into the air. Every degree of specific gravity which has been lost represents a grain of sugar in the ounce of urine. As in this sample experiment the specific gravity fell 30 degrees, the urine contained 30 grains of sugar in every ounce. By multiplying

this by the number of ounces passed in the twenty-four hours it is easy to find the amount of sugar that is being lost daily, and also the improvement, or the reverse, as the result of treatment.

The following is a list of the foods and drinks that are respectively forbidden and allowed to diabetic patients :—

FOODS

FORBIDDEN

Liver, cod's liver, and oysters.
 Sugar, treacle, jams, honey.
 Bread, biscuits.
 Oatmeal, arrowroot, cornflour.
 Sago, tapioca, rice.
 Macaroni, vermicelli.
 Farinaceous puddings.
 Potatoes (except in small quantity),
 carrots.
 Beetroot.
 Parsnips, beans, peas.
 Pastry and sweets.
 Sweet and preserved fruits.

ALLOWED

Butcher's meats of all kinds.
 Ham, bacon, tongue.
 Poultry and game.
 Fish of all kinds.
 Meat extracts, broths, and soups (if not
 thickened with starch).
 Jellies without sugar.
 Eggs, prepared in any way.
 Cheese, butter, cream, custards.
 Diabetic substitutes for bread.
 Saccharin or saxin.
 Cabbage, endive, spinach, turnip tops.
 Broccoli, Brussels sprouts, French beans.
 Lettuce, watercress, cucumber.
 Mustard and cress, spring onions.
 Tomatoes.
 Nuts (except chestnuts).
 Mushrooms, asparagus (green part).
 Strawberries, gooseberries, raspberries
 currants, peaches, and nectarines
 (occasionally).
 Oranges and lemons.
 Pickles, olives, vinegar, oil.

DRINKS

FORBIDDEN

Sweet and sparkling wines.
 Malt liquors (ale, stout, and porter).
 Cider, lemonade, ginger beer.
 Liqueurs and sweet spirits.
 Cocoas and chocolates.

ALLOWED

Water ; milk in small quantity.
 Tea, coffee, cocoa nibs.
 Soda, potash, natural mineral waters.
 Claret, Burgundy, dry sherry.
 Hock, Sauterne, Chablis, champagne
 (dry).
 Brandy and whisky (unsweetened).
 Fresh lemon juice, bitter ale.

DIABETES INSIPIDUS

Is quite a different disease from diabetes mellitus, for in the former the urine contains no sugar. The condition is better named polyuria, or "much urine," for its one prominent symptom is an excessive flow of urine, which is naturally accompanied with great thirst. The urine is pale and has a low specific gravity—from 1,001 to 1,010; it contains no sugar or albumen. The general health remains unaffected. It is not a common complaint, but is occasionally met with at all ages—more often in the young and in males. It is often hereditary, several successive generations in a family being affected. It may be caused by nervous affections due to excitement or injury, and has apparently in some instances been brought on by drinking large quantities of cold fluids or by exposure to cold.

Little can be done in the way of treatment, but in some cases the disorder gradually passes off spontaneously. Plenty of fluid should be drunk to make up for the great loss. Care should be exercised to keep the body warm and to avoid chills. The cause, if discoverable, must be removed, and tonics and change of air to the seaside may receive a trial.

URÆMIA

Is a serious complication of some diseases of the kidney, and is most likely to occur in the affections that are attended by a great diminution in the amount of urine secreted. It is caused by the retention in the body of urea and other waste products which act upon the nervous system, and the attack is often induced by pregnancy or drunkenness. Medical aid should be obtained without delay.

The symptoms include drowsiness passing into unconsciousness, delirium, convulsions, uncontrollable vomiting and diarrhœa. In most cases the disease ends fatally. Treatment must be prompt and active—free purging to remove the poison; hot poultices and fomentations to the loins to aid the action of the kidneys, and hot-air or hot-water baths to encourage perspiration. The diet must consist of fluids, milk taking the chief place.

MOVABLE KIDNEY

The kidney is sometimes so loosely fixed in its natural bed in the loin that upon the slightest exertion it slips out of place, and it is then called a floating or movable kidney. It is met with much more frequently in women than in men, and the right kidney is about twice

as often affected as the left. The causes are not very definite, but as it is chiefly met with in women who have had large families, or who have rapidly lost flesh, it is probable that the kidney becomes loosened by the stretching of its connecting bands and by the disappearance of the fat in which it is imbedded. It may also be displaced by a severe strain or injury.

Many cases of floating kidney occur in which no symptoms exist, but in others there is a great deal of pain in the loin of the affected side

Symptoms. and in the back and abdomen, and a sensation of dragging and weakness. The symptoms come on when the patient is tired, or even simply upon assuming the erect position. Occasionally also hysteria is developed, and many imaginary troubles which cannot in any way be explained by the simple displacement of the kidney. In really bad cases the sufferer becomes quite unfit to attend to her usual duties, and is to all intents and purposes an invalid. The kidney can be felt far from its natural position; it can be moved about from place to place, and can be pushed back into its normal situation. There is no danger to life, for usually the kidney is quite healthy, and the condition of the urine normal.

This is one of the conditions much benefited by the "rest cure," for although a month's rest in the recumbent position will not refix the

Treatment. kidney in its place, it will remove most of the troublesome symptoms and improve the health. During the rest cure the patient is well fed, and the functions of the various organs regulated, and the muscular tone improved by massage. When she gets about again she must wear a belt, which will make her comfortable and prevent a recurrence of the displacement. It must fit the figure well, and be so arranged that it can be laced up firmly, beginning at the lower part of the belt, so as to raise the kidney. The patient must wear proper corsets, must not lace tightly, and, as far as possible, must avoid the dragging of clothes round the waist. A special instrument or truss has been designed by Sir Frederick Treves to hold the kidney in its natural situation. Occasionally the displacement may be so extreme, or the symptoms so troublesome, that an operation is necessary. The kidney is then stitched to the surrounding parts, and thus maintained in position.

INFLAMMATION OF THE KIDNEYS (BRIGHT'S DISEASE)

Several different forms of disease of the kidneys are included under the term Bright's disease, but the most important are those conditions

produced by inflammation of these organs, and our remarks will therefore be limited to these. We shall divide the subject into two parts : (1) acute and (2) chronic inflammation of the kidneys. These affections have derived their name from the eminent physician Dr. Bright, who first described them in 1827.

Acute inflammation of the kidneys is generally caused by exposure to cold or wet, especially when in a state of perspiration. It often occurs as a complication of other conditions, which may be therefore looked upon as predisposing causes; such are pregnancy, heart disease, gout, and malaria. It is one of the most serious complications of acute feverish diseases, such as diphtheria, erysipelas, measles, acute rheumatism, and especially scarlet fever. Certain irritating poisons also produce acute kidney inflammation, such as alcohol taken in excess, and Spanish fly (cantharides) and turpentine in poisonous doses.

The attack may come on quite suddenly, with rigors and fever, or gradually. Dropsy is almost always one of the earliest symptoms, and is often first noticed in the eyelids, gradually spreading over the whole body. The temperature is generally raised somewhat above normal and the pulse slightly quickened, but the symptom which soon attracts most attention is the condition of the urine, which is small in quantity, thick, and smoky in appearance, or it may be distinctly blood-stained. If it is boiled it is found to contain large quantities of albumen, and, examined under the microscope, it is seen to contain blood corpuscles and casts of the kidney tubules. In bad cases the urine may grow more and more scanty, until it is suppressed altogether and the symptoms of pronounced uræmia set in, the result of the accumulation of waste products which should have been carried off through the kidneys. Backache and pain across the loins are common, and so also are headache, vomiting, and general dyspeptic symptoms. The case may terminate fatally at this stage from suppression of urine and uræmia, or treatment may gradually prove successful; the kidneys begin to act more freely, the dropsy disappears, and health is slowly restored. In some cases these signs of improvement occur, but the albumen does not entirely disappear from the urine. A constant drain of nutriment is thus continued, and general debility and anæmia are set up, leaving the patient a chronic invalid, prematurely aged and worn.

The treatment of acute Bright's disease should not be undertaken without professional assistance, unless from necessity. The first thing

is for the patient to go to bed and keep warm. He should be clothed in flannel, and lie between the blankets. Cold is the great enemy to

Treatment. guard against, but this does not dispense with the necessity

for fresh air in the bedroom. We have next to do our best to relieve the inflamed kidneys, and for this purpose nothing is better than linseed poultices applied to the loins. They should be large and hot, and be changed every three or four hours, or even oftener if they get cold. Flannels wrung out of hot water may be used instead, and should be covered with waterproof material to retain the heat and keep the bedclothes dry. A few leeches applied to the loins will give relief in the early stages. A hot-air or hot-water bath every other night encourages the action of the skin and relieves the kidneys of some of their work, but great care must be taken to avoid chill. The patient should drink freely of simple fluids, such as water, milk, and barley-water; and the secretion of urine may be assisted by an unirritating diuretic mixture, which, whilst stimulating the kidney, will not injure it. The following is both simple and safe:—

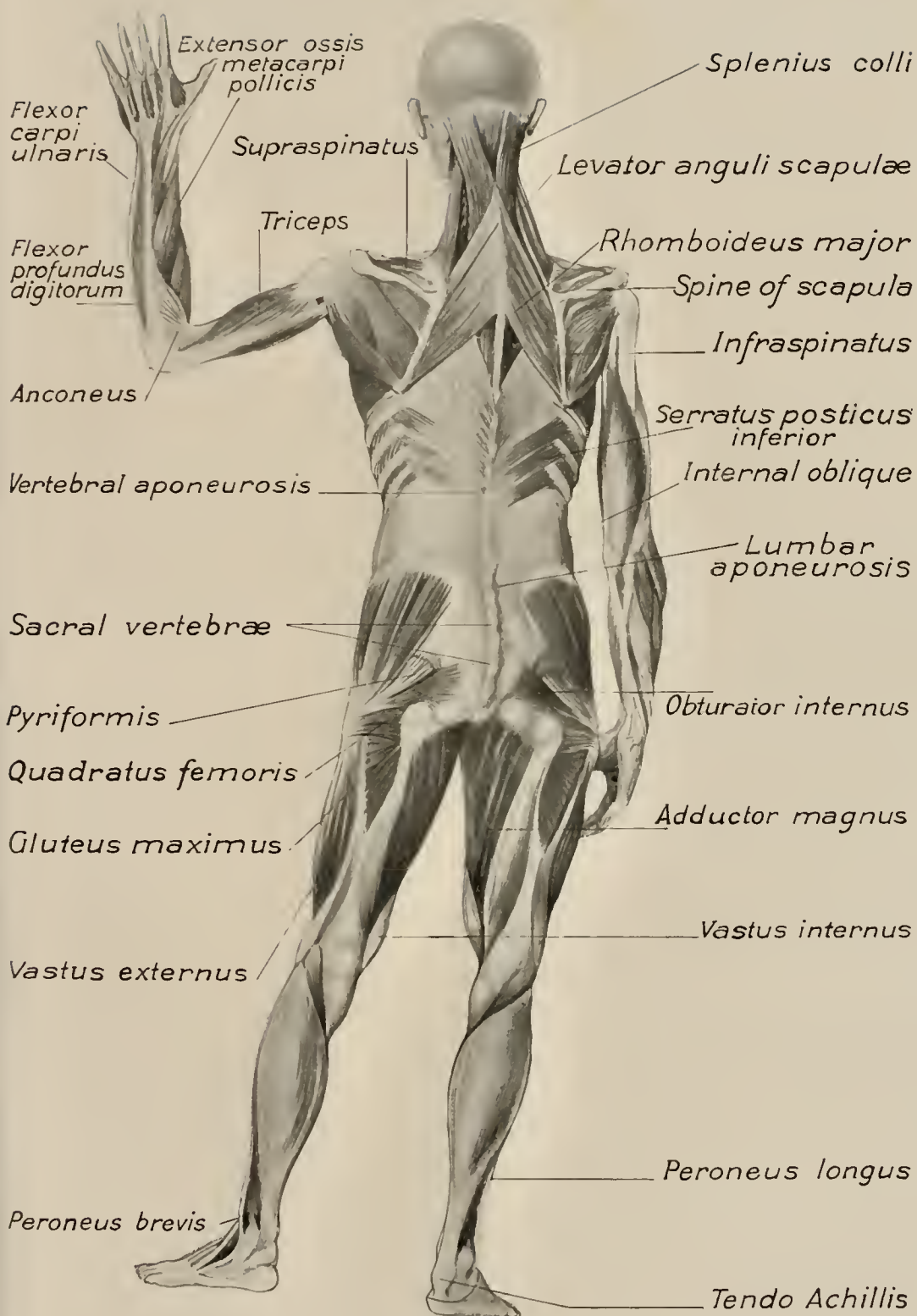
PRESCRIPTION 59

Citrate of potash	2 drachms.
Solution of acetate of ammonia	2 ounces.
Tincture of digitalis.	1 drachm.
Bromide of potash	2 drachms.
Cinnamon water to 8 ounces.	

An eighth part to be taken every 3 or 4 hours.

The bowels must be freely opened, for by this means the waste products may be removed from the body. Half a teaspoonful of the compound jalap powder should be given at once, and repeated at intervals as the condition of the bowels requires. For other medicinal treatment we must refer to the remedies prescribed for chronic Bright's disease (p. 167) and dropsy (p. 179), which include diuretics, tonics, and general hygiene.

In the acute stage the diet should be almost entirely limited to milk. There is little appetite and much thirst, and in this way nature gives definite guidance. The stomach must not be taxed by administering too much at a time, but milk, milk and water, and skimmed milk may be taken frequently and freely. As improvement takes place this must be supplemented with light farinaceous milk foods, the patient only returning to solid articles and meat foods when convalescence is established.



DEEP VIEW OF MUSCLES, FROM BEHIND.

Chronic Bright's disease is, in very many cases, brought on by excessive indulgence in alcoholic drinks, especially spirits. It is not the man who indulges in a violent burst of intoxication who is liable to be attacked, but the dram-drinker who is in the habit of using ardent spirits at all times of the day without necessarily becoming actually intoxicated. The constant irritation of the alcohol on the kidney sets up most insidiously a state of inflammation. Lead poisoning is another cause, met with in those whose occupation obliges them to work daily with lead, such as plumbers and painters, but occasionally also arising in persons into whose systems the metal finds its way in minute quantities in drinking water. Gout, again, is a fruitful cause of chronic disease, and produces a condition called the "gouty kidney." In cases of long-continued and free discharge of matter, and in prolonged exhausting illness, a special form of chronic Bright's disease is set up, and the kidney is spoken of as "waxy" or "amyloid."

The symptoms of chronic Bright's disease come on very insidiously, and the disease has probably existed long before anything has been noticed to arouse suspicion. The patient suffers from indigestion and ever-increasing debility; his appetite fails, and his eyelids swell. His water is much increased in quantity, and is very pale, and on being examined is found to contain a distinct trace of albumen. The outlook is decidedly gloomy. The disease is, however, very slow, lasting perhaps for years, and it may be kept much under control by proper dieting and careful living. But the patient is unable to get through the same amount of mental work that he could do before; his thoughts get confused, his head aches, his digestion suffers; his sight is liable to fail from disease of the retina; and he becomes almost unwittingly an invalid. Some day he catches cold; gastric catarrh, or bronchitis, or lung trouble sets in; things go badly with him from his enfeebled constitution, and the end comes from uræmia or some inflammatory disease.

The various symptoms must receive attention as they arise, and the general health must be maintained by observance of hygienic principles and by tonics. When any definite cause can be found it must be removed. Alcoholic stimulants must be reduced to a minimum; abscesses must be healed; diseased bone must be removed; the entrance of lead into the system must be prevented; gout must be relieved. As a tonic one of the following prescriptions may be employed :—

Chronic:

Causes.

Symptoms.

Treatment.

PRESCRIPTION 60

Tincture of the perchloride of iron . 80 drops.
 Sulphate of quinine . . . 8 grains.
 Spirits of chloroform . . . 2½ drachms.
 Water to 8 ounces.

An eighth part to be taken 3 times a day after food.

PRESCRIPTION 61

Citrate of iron and ammonia . . 80 grains.
 Tincture of nux vomica . . . 80 drops.
 Carbonate of ammonia . . . 24 grains.
 Chloroform water to 8 ounces.

An eighth part to be taken 3 times a day before food.

Or half a teaspoonful of Easton's syrup with water may be taken three times a day before meals.

The amount of animal food must be limited, but the diet must be nourishing. When there is much albumen in the urine it is not ad-

Diet. visable to reduce the animal food too much, a moderate amount being required to make up for the constant loss from the body. In such cases butcher's meat should be taken very sparingly, but fish, chicken, game, and white meats may be allowed. Vegetables of all sorts are permissible, and the patient may adopt a purely vegetarian diet in those cases in which the albumen is only present in small quantities.

Milk is undoubtedly the great stand-by in kidney disease. It can be taken freely, and, besides providing nourishment, it acts as a diuretic, encouraging the action of the kidneys.

The foods to avoid are butcher's meat (with the exceptions referred to above), all strong soups and extracts of meat, eggs (except in great moderation), sugar, pastry, and sweet foods in general, and all alcoholic drinks.

The patient should aim at leading an easy life, without anxiety or excessive mental strain. Exercise is useful in moderation, and a daily walk or ride helps to keep the excreting organs active and the skin at work, but fatigue is injurious. Particularly is it of importance to avoid all risk of chill; the body must be kept warm, woollen clothing being worn next the skin even in summer. The bowels must be regulated by gentle aperients. If circumstances permit, the winter should be spent in a warm, equable climate.

INFLAMMATION OF THE BLADDER

Acute cystitis, inflammation of the membrane that lines the bladder, is not a common affection. It may arise from injury, either from a stone in the bladder or from passage of an instrument; from exposure to cold, as in sitting on a cold stone or on wet grass; and in women from internal displacements.

Acute Cystitis.

The symptoms are pain in the lower part of the abdomen, slight fever, with chilliness and perhaps rigors. At the same time there is a constant desire to pass water, with a feeling of urgency which prevents any delay. The urine is mixed with mucus, and in the later stages with matter also. In the most acute cases blood is passed.

Chronic inflammation of the bladder, more common than the acute form, may follow an acute attack or be set up by anything that causes difficulty in passing water, such as a stone in the bladder, stricture, or tumour. With these troubles a certain amount of urine is always left in the bladder after passing water, causing irritation and setting up inflammation of the mucous membrane. Much mucus is formed, and the urine decomposes rapidly, so that when passed it is alkaline, and smells very offensively. A gouty constitution strongly predisposes to this complaint.

Chronic Cystitis.

The symptoms are very similar to those of the acute form, the most marked being the constant desire to pass water, with a sensation of weight and discomfort, but the general health is not much affected.

The urine, if allowed to stand, exhibits a peculiar appearance, which can be seen distinctly if it be kept in a glass; three separate layers, or zones, form—the lowest of matter, the middle of mucus, and the upper of clear urine; and red litmus paper turns blue when dipped in the urine.

In acute cases the patient must stay in bed, and will obtain relief from pain by sitting in a hot hip-bath, or by poultices or fomentations to the lower abdomen. He must drink freely of milk, barley-water, linseed tea, and such simple fluids, and his diet must be limited to slops and light farinaceous foods, but no alcohol must be allowed. The bowels should be kept free, and the following mixture taken :—

PRESCRIPTION 62

Tincture of henbane	2½ drachms.
Solution of potash	2½ drachms.
Chloroform water to 8 ounces.	

An eighth part to be taken every 2 hours.

To each dose 10 drops of laudanum may be added so long as the pain is severe.

When the urine is very offensive, much benefit is obtained by also adding to each dose of this medicine $7\frac{1}{2}$ grains of helmitol or urotropine, for both of these drugs act as antiseptics in the bladder, destroying any germs which may have found their way into it, and thus checking decomposition.

Further measures of great importance may be carried out by a surgeon. He may relieve the cause of the obstruction which so commonly exists in cases of chronic cystitis by passing a catheter and completely emptying the bladder of the decomposing urine. The cure of the disease also is much accelerated by applying drugs internally to the bladder, and by washing out this organ with antiseptic and soothing lotions or astringent preparations—boracic acid being most commonly used for the former purpose, and hazeline or a silver salt for the latter.

IRRITABILITY OF THE BLADDER

A constant desire to pass water is a very common symptom, and is present in almost all affections of the bladder and kidneys. In a healthy state a man passes water five or six times a day, and not at all at night, and in women the need is less frequent than in men; but in disease it may be necessary to do so every hour, and at night as well as day. This symptom is met with in all cases of inflammation of the bladder, and when foreign bodies or tumours are present in it, in

Causes. stricture or inflammation of the urethra, and when the urine is very concentrated or very acid. It also occurs in the various diseases of the kidneys included under the name of Bright's disease, in diabetes, and in many cases of gout. Many conditions nervous in origin produce it, such as hysteria, in which affection it is often accompanied with a greatly increased quantity of urine. It is a symptom familiar to all at times of emotional excitement and anxiety. In young children this condition may become most troublesome, and be brought on by the slightest irritation of the urinary organs, and may, if neglected, continue almost to adult life.

The treatment must be directed to the cause, by removing which only can the symptom be removed. In those cases where the urine is very

Treatment. acid or very concentrated, the treatment is simple. Many persons, imagining that by diminishing the amount of urine they will lessen the constant inconvenience and pain of passing it,

refrain from drinking fluids of all kinds, while the right method of cure is the exact opposite. By diminishing the fluid they increase the irritating property of the urine, whilst by freely taking water and simple drinks they reduce its concentration and acidity, and cure their complaint.

INCONTINENCE OF URINE

Is the loss of power to retain the water, which flows away constantly and involuntarily. It occurs most commonly in diseases of the nervous system in which the bladder and the muscles controlling its action are paralysed. It is then of but secondary importance to the paralysis producing it. Sometimes, especially in women, it is the result of displacement of the surrounding parts, which drag upon and displace the bladder and urethra, and allow the urine to escape. It may in these cases run away constantly, but generally it only does so upon any slight exertion or effort, as in lifting a weight, or when coughing or sneezing, the control over the muscles being sufficient to retain it at other times. As a result of this constant leakage the clothes are always wet, and the skin, soaked in urine, becomes sore. The poor patient is kept in a state of misery and discomfort, besides being unpleasant to others from the disagreeable urinous smell. Such conditions are unsuited to domestic treatment, but a doctor has many measures by which he may be able to give relief.

In men a somewhat similar trouble occurs from a totally different cause, which is described on pp. 172-3.

RETENTION OF URINE

This is the term employed to signify a want of power to pass water, and it must not be confused with a far more serious condition called suppression of urine (see p. 173), in which no urine is passed because there is none in the bladder. Retention is produced by anything which obstructs the flow along the urethra; this narrow tube, which

Causes. varies from one-sixth of an inch in the male to one-third of an inch in the female at its narrowest part, is easily blocked by slight pressure or by any swelling of its lining membrane. Tumours, stricture, stone, inflammation, or displacement may all in different ways cause obstruction. A very common obstruction in elderly men is due to enlargement of the prostate gland, which is dealt with on p. 173. Loss of power in the muscles of the bladder, from paralysis or from a condition called atony, will also cause this trouble.

Atony is often due to the unfortunate habit some persons get into, either from modesty or from carelessness, of retaining the urine for long periods, even after nature has drawn attention to the need for emptying the bladder. This organ, after a time, ceases to rebel, and allows itself to be enormously distended by the retained urine, and the muscular walls are so stretched that they become temporarily paralysed, and cannot discharge the urine when called upon to do so.

Occasionally the nervous system is at fault; many people are troubled by this symptom through want of will-power, simple nervousness, or anxiety. Muscular spasm may occur, or the presence of a painful affection of the surrounding parts may render it almost impossible for the patient to make the requisite effort. This is not an uncommon complication after surgical operations, such as that for piles or appendicitis, or any other in which the muscular effort of straining is painful. The mere fact of confinement to bed makes this necessary performance a trial, at any rate for the first few days, although it must be very few who do not rapidly accustom themselves to their altered circumstances.

In all these cases the patient finds himself unable to pass his water, although he has great desire and makes strong efforts to do so. The bladder becomes gradually distended until it can be felt as a large, firm swelling in the lower part of the abdomen. Although instances are known in which the bladder has held many pints of urine under such circumstances without bursting, it would not be wise to count upon this power of elasticity, but relief should be obtained without delay.

The treatment should be directed to the removal of the cause, if that is known. A hot bath should be tried, for spasm and swelling are thereby relieved, and the patient often has the satisfaction of feeling that the water begins to run away, and comfort is obtained, at any rate, for a time. A hot sponge applied locally, or sitting over steam, may have a similar effect. Twenty drops of laudanum in a wineglassful of water may be taken, or given as an injection into the bowel, or a free rapid purge administered.

If these measures are unsuccessful, surgical assistance must be procured, and instant relief may be obtained by the simple procedure of passing a catheter.

In many of these cases of retention of urine, when the obstruction is incomplete, or when the bladder has lost its power of contracting and emptying itself, the urine is liable to dribble away and overflow,

as it were, from the distended bladder, and the condition might be mistaken for incontinence of urine, which we have already described. This mistake can be avoided by examining the lower part of the abdomen, where the distended bladder can be felt. A catheter, too, if passed, will draw off a large quantity of urine, but in true incontinence the bladder would be found to be empty.

SUPPRESSION OF URINE

Indicates that the kidneys have ceased to act, and is almost confined to cases of Bright's disease. Occasionally, however, suppression may result from conditions of the nervous system which are not at present understood. For a time symptoms do not show themselves, but if the secretion is not rapidly re-established the condition of uræmia sets in, and very frequently ends fatally. The symptoms and treatment are described in the section on Uræmia (p. 163). It is important to distinguish between suppression of urine and retention, and this may be done by referring to the section on Retention of Urine (p. 173).

DISEASES OF THE PROSTATE GLAND

This gland, as has previously been explained (p. 148), surrounds the male urethra, close to the neck of the bladder, and is liable to be attacked by inflammation. There is then a great frequency in passing water, with much pain in the act and much tenderness in the part when the bowels act. If an abscess forms it may break into the bowel, urethra, or bladder, or through the skin. Occasionally, in irritation of the prostate, its secretion is passed in the urine, and appears as little white threads, which can be seen after the urine has stood for a time. Sometimes little stones or calculi form in this gland.

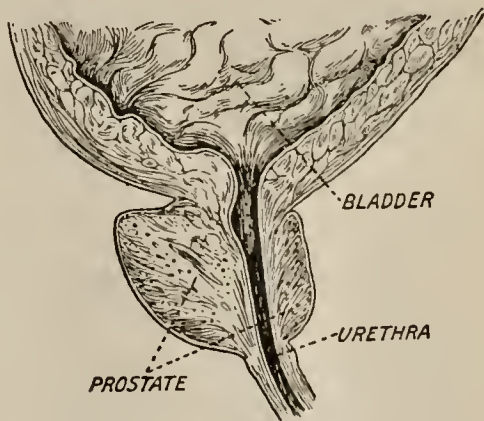


Fig. 16.—THE PROSTATE GLAND.

But the most common disease of the prostate is a chronic enlargement of the whole or certain portions of the gland, which is called **Enlargement.** hypertrophy. This condition only affects men over the age of 54, but is said to be present in one-third of all men above that age. The majority suffer no inconvenience from it, especially if the enlargement affect the lateral portions of the gland.

If, however, the central part is involved, trouble in passing water is sure to arise, and may take many forms. The water is ejected with much diminished force; it is passed more frequently than is natural, especially at night; it is passed with difficulty, and this is most felt on first rising in the morning; it is passed with much straining, which may give rise to piles. After a time inflammation of the bladder (cystitis) is set up by the retention of a certain portion of urine in the bladder, which the utmost efforts fail completely to empty. Finally the obstruction grows extreme, and the bladder becomes distended by the urine, which causes the greatest discomfort by constantly draining away involuntarily both day and night. If this condition continues unrelieved, discomfort passes into illness, and illness may end in death.

The treatment involves the use of a catheter—a long, flexible tube, which is passed along the urethra into the bladder, and entirely empties this organ of all urine. This must at first be done by a **Treatment.** surgeon, and when the patient has become accustomed to the operation and has learnt the process, he can carry it out himself once a day, or as often as circumstances require. When once this artificial assistance has become necessary it will continue so until the end of life.

One point of utmost importance that must be insisted upon is the perfect surgical cleanliness of the catheter, which can only be obtained by the intelligent and careful use of antiseptics. In extreme cases it becomes necessary to have the enlarged prostate gland removed, an operation which often leaves the patient in a state of perfect comfort.

GRAVEL AND STONE

The urine contains amongst its solid ingredients certain salts which, in a state of health, are usually kept in perfect solution, and are carried off from the body without causing any inconvenience. Occasionally, however, in a state of perfect health, the urine, after it has been passed for some little time and become cold, forms deposits in the vessel in which it has stood. Further, there are certain conditions of the body in which these salts are deposited before the urine is passed; they are present in the urine as small granules whilst it is in the urinary passages, and to these the name of *gravel* is given. If the particles of gravel deposited in the urinary organs form masses or concretions, they are termed *calculi* or *stones*. It is easy thus to see how calculi form, but it is not so easy to explain *why* they do so.

The chief salts (or, to be more correct, the chief solid constituents) of the urine are uric acid, oxalate of lime, and phosphates; and the three chief varieties of stone consist of these substances, so that there are uric acid, oxalate of lime, and phosphatic stones. Calculi of other substances also occur, but much less frequently. Stones may consist of any one of these substances alone, or of two of them mixed in successive layers—for instance, uric acid and phosphates.

The predisposing causes of urinary calculus are still very imperfectly known, but it is easy to understand that if any circumstances arise which produce a great increase in the body of any stone-producing material, there would be much more of it carried off in the urine, and therefore greater liability to the formation of stone. Calculus is very frequent in gouty persons and in those who live unhealthy, sedentary lives, or who indulge to excess in good living, whilst agricultural labourers and sailors, whose lives are eminently active, are peculiarly free from it. It is met with at all ages, but is most common in early life (especially in boys) and in advanced age. In certain districts calculus occurs with special frequency, as in Norfolk and the East of Scotland. It is quite possible that this may be explained by the presence in the drinking water of a large amount of salts, especially lime salts, in solution.

With very few exceptions phosphatic stones originate in the bladder, and not in the kidney, and are due to the deposition of phosphates in decomposing urine. On the other hand, uric acid and oxalate of lime stones almost always form in the kidney, and, when they are found in the bladder, have passed from the kidney along the ureters when quite small. Stones in large numbers may form in the kidney, and either collect in its substance or pass one after the other along the ureter.

In the bladder a single stone is the rule, but cases are reported in which many hundreds have had to be removed.

The size and weight of the stones depends to a great extent upon the length of time they have taken to form. In the kidney stones have been met with which quite filled the whole organ, and in the bladder they sometimes have weighed several pounds. But very large stones are not likely to be met with nowadays, for our means of recognising them are more efficient than they used to be, and the employment of X-rays enables us to detect even the smallest. Moreover, surgical operations are accompanied by less danger, and stones can be removed from the kidney without the complications and anxieties of former days.

Having, therefore, explained the mode of formation of urinary calculus, we will pass on to the symptoms it produces, and these differ according to whether it forms in the kidney or the bladder.

When a renal calculus has attained a certain size it causes pain in the loin of the affected side, which spreads into the groin or the abdomen, and is always increased by violent exercise or when the body is much shaken. On the other hand, the pain disappears if the patient takes complete rest. The urine often contains blood, which is increased by exertion, and disappears with rest. The stone gradually grows larger, and irritates and destroys the substance of the kidney, until, after a time, inflammation is set up and matter forms. This leads to serious ill-health, and if it is unrelieved the patient may be worn out by constant discharge and suffering, and may finally succumb.

Stone in the Kidney. A stone formed in the kidney is very liable, whilst it is small, to be dislodged and pass into the ureter. If quite small it may pass easily along it to the bladder without giving any signs of its presence; but if larger it sets up a train of symptoms which go by the name of renal colic. They usually come on quite suddenly after a violent exertion or shaking, and for this reason are not uncommonly met with in persons on a railway journey. The pain begins in the affected loin, shoots downwards to the groin or thigh, or even as far as the leg, and with it there may be violent vomiting. The patient becomes faint, breaks out into profuse perspiration, often rolls about in agony, and is prostrate and exhausted. He feels a constant desire to pass water, and when he does so the water is seen to be stained with blood, and may be full of clots. When the stone reaches the bladder the pain passes off as rapidly as it began. If it catches in the ureter the acute pain subsides, but a dull aching in the loin remains, and another acute attack will come on whenever it begins to move onward again.

When a stone is present in the bladder there is a constant desire to pass water, a few drops only being voided, with great pain and straining. The pain is of a cutting character, and is most felt at the external opening of the urethra and at the termination of the act of passing water, when the bladder is empty and contracts on the stone. Occasionally a sudden stoppage in the flow of urine occurs from the stone falling over and blocking the opening of the bladder. The urine contains mucus and pus, and very often blood. By means of the X-rays the shadow of stones in

Stone in the Bladder.

any part of the urinary organs, kidney, ureter, or bladder can often be clearly seen, and the size and situation recognised.

We must now turn to the treatment of gravel and stone, and it will be convenient to divide the subject into three parts : (1) the treatment of renal calculus and its prevention, (2) the treatment of renal colic, and (3) the treatment of stone in the bladder.

1. When a patient is known habitually to pass urine which is highly acid and contains large quantities of solids that form visible deposits, it is necessary at once to take measures to correct the tendency. By doing this we shall prevent the formation of renal calculus. The patient must carefully avoid all causes which produce this condition; he must eat freely of no form of food, but particularly avoid all excess of animal foods; he must not drink water which contains any large amount of salts; he must live, as far as possible, a healthy, active life, with outdoor exercises and amusements. He must attend to the proper action of his various organs: indigestion must be cured; the liver must be kept active and the bowels regular; the latter can best be done by the alkaline mineral waters of Carlsbad or Friedrichshall. Lastly, he must take an abundance of simple drinks. Water is the best solvent, and should be taken freely, either hot or cold, and it is best not to drink it at meal-times, but to take a glassful in sips when dressing and undressing, and another glassful during the day. As the stones which form in the kidney are usually acid in nature, a useful antidote is found in alkaline salts and drinks. These may be taken in medicines, the bicarbonate of soda and the tartrate of potash being particularly useful, or in the natural alkaline mineral waters.

Sir Lauder Brunton tells the story how "a certain Mrs. Joanna Stephens possessed a secret remedy for stone, which was so celebrated that the British Parliament purchased it in 1739, for the public benefit, from the old woman for £5,000. When they had got the secret, this valuable remedy was found to consist of calcined eggshells, soap, and some aromatic bitters, so that its essential ingredients were neither more nor less than a little carbonate of lime with a little phosphate." He therefore recommends the administration of some lime-water or carbonate of lime with carbonate of potash or soda. Carbonate of lime or prepared chalk, 20 or 30 grains in mucilage of gum, with some peppermint water, taken three or four times a day, has also been found of much benefit. The treatment by the natural mineral waters is to be strongly recommended in all cases of renal calculus or of a tendency

to this affection. When possible it is always best to carry out the treatment on the spot, for there the patient is able to devote himself to his cure, and is surrounded by other persons similarly engaged. He will then obtain rest of mind, change of air, healthy routine, as well as a course of the waters. If it is impossible for the patient to leave home, the waters from most of the more noted springs can be obtained at home. There are many waters which can be highly recommended, some of the best being Contrexéville, Carlsbad, Vichy, and Wildungen.

2. The treatment of renal colic must be much more active than that for a stone in the kidney, for directly the patient begins to move he is in extreme agony. A good plan is to get a hot bath ready without delay and put him into it, or get him to bed and apply good hot linseed poultices or fomentations to the painful part, sprinkled with laudanum or tincture of belladonna. If these do not bring relief give 15 to 20 drops of laudanum, with water, by the mouth, or if the vomiting is severe a $\frac{1}{4}$ -grain morphia injection under the skin, or $\frac{1}{2}$ -grain morphia suppository in the rectum. An even more rapid sedative is chloroform, of which 30 drops may be sprinkled on a handkerchief and inhaled. The bowels should be cleared out with copious injections of warm water, and relief from the pain is sometimes obtained, when the stone is passing on the left side, by an enema of hot water or of gruel. If a patient has had several attacks, much benefit is obtained by taking salicylate of soda in the intervals, in the following prescription:—

PRESCRIPTION 63

Salicylate of soda	1 drachm.
Tartrate of potash	$\frac{1}{2}$ ounce.
Spirit of juniper	$\frac{1}{2}$ ounce.
Lime water	4 ounces.
Water to 8 ounces.	

An eighth part to be taken 3 or 4 times a day.

This should be continued for some time after all pain has ceased, and may prevent its return.

Sometimes an operation may be deemed necessary to remove a stone from the kidney or ureter. It is always, of course, a serious matter, and although the results are nowadays very satisfactory, it is only undertaken in cases in which other treatment has failed.

3. The treatment of stone in the bladder is almost entirely surgical.

There are two methods of operating. In one—lithotrity—the stone is crushed by a pair of strong forceps, and the broken-up fragments are washed out of the bladder through a long tubular instrument. The other—lithotomy—consists in cutting a hole into the base of the bladder, and then seizing and extracting the stone through this opening. The former is preferable if possible, as there is no wound and less danger. If, however, the stone is very hard or very large, there may be less risk in the cutting operation. Surgeons are becoming very skilful, and instruments are constantly being improved, so that probably the time is not far off when “cutting for stone” will become obsolete. In women the urethra can generally be stretched, and the stone removed with forceps.

DROPSY

This term is used generally of any accumulation of watery fluid in the loose tissue under the skin or in one of the body-cavities, while special names are given to the various forms of dropsy, according to the portion of the body affected. Thus, if the fluid be confined to the skin it is called anasarca, or œdema; if it is in the abdomen it is ascites; if in the brain, hydrocephalus (popularly “water on the brain”); if in the chest, hydrothorax, or pleural effusion.

It is caused by the watery portion of the blood oozing out of the blood-vessels in greater quantity than in health, and more rapidly than it can be taken up again. This increased flow from the blood-vessels may be caused either by some blocking of the veins and an interference with the flow of blood along them, or by a watery, unhealthy condition of the blood itself.

Dropsy is a symptom of many diseased conditions, some serious and others of slight importance. Disease of the kidneys, especially Bright’s disease, is very commonly accompanied by dropsy; the blood in this complaint is altered and unhealthy, and soaks out of the blood-vessels with great rapidity.

Dropsy may be due also to heart disease, the heart being too weak to drive the blood freely through the vessels, so that there is stagnation of the circulation, and the fluid part of the blood oozes out of the vessels. But this weakness is due not only to dangerous heart disease; it may occur with the feeble heart of debility, which treatment can rapidly remedy.

Dropsy may be caused, again, by the watery condition of the blood

in severe anæmia, and a course of iron will soon remove both it and the anæmia.

In the disease of the liver called cirrhosis, the blood-vessels in that organ are pressed upon and obstructed, and as a consequence fluid collects in the abdomen. It is in this variety of dropsy that such enormous quantities of fluid form, so that the abdomen gets greatly distended, and the fluid presses upwards and displaces the heart—a condition expressed popularly as “the water reaching the heart.”

Dropsy in heart disease first and chiefly shows itself in the feet, whilst that of kidney disease is first noticed in the eyelids. Dropsy may be purely local. Thus, the swelling round an inflamed part is localised dropsy; and if a vein is obstructed, the part from which that vein ought to carry the blood becomes dropsical. A well-known instance of this is “white leg,” which is caused by the blocking of the large vein of the leg.

External dropsy, or anasarca, is easily recognised. The limb is swollen, soft, and inelastic, and if the finger is pressed into it a little hollow or depression is made which very gradually fills up again as the fluid flows back; this is technically called “pitting.” The skin is peculiarly white, and, if the swelling is great, may be smooth, tense, and shiny, or even dull reddish or purple. The swelling is often affected by the position of the body. In the evening, after standing or walking about, the legs and feet are much swollen, but in the morning, after a night's rest, the swelling may almost have disappeared. The other symptoms which accompany dropsy are chiefly those of the disease producing it.

The treatment of dropsy must, of course, depend much upon its cause. For instance, heart tonics must be given to strengthen the heart, or iron to remove anæmia. In such cases the following mixture would give relief:—

PRESCRIPTION 64

Citrate of iron and ammonia	80 grains.
Solution of strychnia	24 drops.
Tincture of digitalis	40 drops.
Spirits of chloroform	2½ drachms.
Water to 8 ounces.	

An eighth part to be taken 3 times a day after food.

Digitalis is one of the most useful drugs in treating a case of dropsy, and it can be taken in a mixture as above, but a very

favourite form for ascites is that of a pill with squills and blue pill. Thus :—

PRESCRIPTION 65

Blue pill	.	.	.	.	.	.	.	2 grains.
Squills	.	.	.	.	.	.	.	2 grains.
Digitalis leaves	.	.	.	.	.	.	.	2 grains.

Make a pill; to be taken once daily.

Dropsy can be relieved to a great extent by rapidly removing fluid from the body, and this can be done in three ways: (1) by giving free purges we can carry it off from the bowels; (2) by giving diuretics, which increase the flow of urine, we can carry it off by the kidneys; (3) by giving diaphoretics, which cause sweating, we can carry it off through the skin.

One of the best medicines for the purpose is the compound jalap powder, of which the dose is from 20 to 60 grains. Probably the most useful drug to act on the kidneys is the resin or balsam of copaiba, a very active diuretic, which has an unpleasant taste and should therefore be taken in the form of a capsule—15 to 20 grains three times a day. It is most efficacious in ascites, especially if this is due to liver complaint. It should never be used in kidney disease. Spirits of juniper is useful in all forms of dropsy, including that of kidney disease—one-half to a teaspoonful should be given three times a day in half a wineglassful of water. Juniper is the flavouring matter in Hollands and gin, and either of these spirits can be used for the same purpose. A very suitable mixture for dropsy is :—

PRESCRIPTION 66

Sweet spirits of nitre	.	.	.	.	.	$\frac{1}{2}$ ounce.
Spirits of juniper	.	.	.	.	.	$\frac{1}{2}$ ounce.
Tartrate of potash	.	.	.	.	.	3 drachms.

Decoction of broom to 8 ounces.

An eighth part to be taken 3 times a day.

In those cases of dropsy in which the kidneys are much affected, and are failing to do their work, the skin should be encouraged to act and carry off the water from the body. This may be done by hot baths—either water, air, vapour, or Turkish.

Lastly, if drugs and other measures are insufficient to give relief, it may be necessary to turn to surgery for assistance, and have the water drawn off by the operation of “tapping.” The fluid of ascites

can be drawn off by a silver tube introduced through the abdominal walls and conducted to a vessel by a flexible indiarubber tube. The water in dropsy of the legs can also be withdrawn through a number of small silver tubes inserted under the skin, or even by the punctures of a triangular-pointed needle. Unfortunately, these operations do not prevent the fluid from re-forming.

ADDISON'S DISEASE

This disorder is named after the doctor who first described it, while, from one of its chief symptoms, it is also called "bronzed skin" disease.

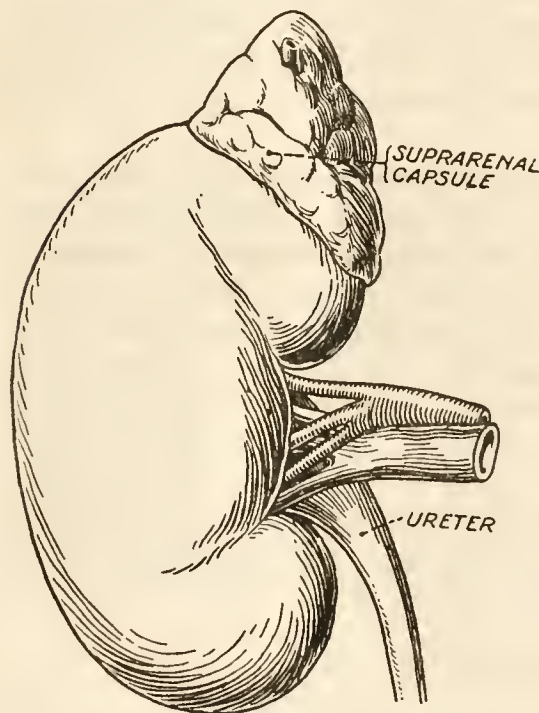


Fig. 17.—SUPRARENAL CAPSULE OF THE RIGHT KIDNEY.

It is a rare affection, and its cause has been traced to tubercular disease of two small bodies situated close to the kidneys, called the suprarenal capsules (Fig. 17). To quote from Dr. Addison, "The leading and characteristic features are anæmia, general languor and debility, remarkable feebleness of the heart's action, irritability of the stomach, and a peculiar change of colour in the skin." The pallor, weakness, and brownish patches on the skin soon attract attention, and are usually rapidly progressive. The prospects are not very hopeful, and no certain cure has yet been discovered.

Although we do not know the uses or value of the suprarenal capsules, much has been learnt in the last few years concerning the action of the material formed in them. This goes by many names, the most common being suprarenal extract. It is useful to both surgeons and physicians. The former find it most valuable in checking hæmorrhage, and bloodless operations can be performed under its influence. Physicians use it as a general tonic and heart restorative. It has been employed with some little success in the treatment of Addison's disease.

CHAPTER IX

THE BLOOD AND THE ORGANS OF CIRCULATION

The Blood—Red Cells—White Cells—Coagulation—The Heart and its Valves—Pericardium—Arteries—Capillaries—Veins—The General Circulation—The Portal Circulation—Velocity of the Blood-Stream—Uses of the Circulation—Arterial and Venous Blood—The Pulse—The Nervous System and the Circulation.

THE body depends for the maintenance of its life and health upon the blood, for "the blood is the life" in so far that it conveys to all parts the requisite nourishment, and carries off all waste materials to the organs which remove them from the system.

If a drop of this fluid is seen by the naked eye it appears uniformly tinted, but examined under a microscope it is found to consist of a colourless fluid, called the plasma, and an immense number of small solid particles—the blood-cells or corpuscles. **The Blood.** The plasma forms about two-thirds of the blood by weight, the corpuscles the other third.

Upon closer examination two forms of blood-cells can be distinguished: (1) the red and (2) the white; but the latter are in a very great minority, for there are about 350 red to one white.

The red cells, when viewed singly, have a pale yellowish tinge, but seen *en masse* they give to blood its deep red colour. Their shape is that of circular discs, like coins, but they are thinner at the centre than at the edges, and it would take ten millions of them placed flat to cover a square inch. Whilst being examined under the microscope they show a peculiar tendency to run together into rolls or columns, like piles of coins (Fig. 18). The colour of these little discs is due to the presence of an iron-containing colouring matter called hæmoglobin, which has a great affinity for oxygen, a fact the importance of which we shall learn later.

The white or colourless corpuscles of the blood are much larger,

and contain a peculiar body in their substance called a nucleus. When dead they are round, but during life they are constantly changing their shape, shooting out irregular arms or processes and withdrawing them again. They are very similar to the minute organism called an amoeba, and are really small living animals, which can be kept alive outside the body if supplied with warmth and moisture.

The extraordinary importance of the white cells, or leucocytes, is only partially understood, but, as is pointed out in the Introduction

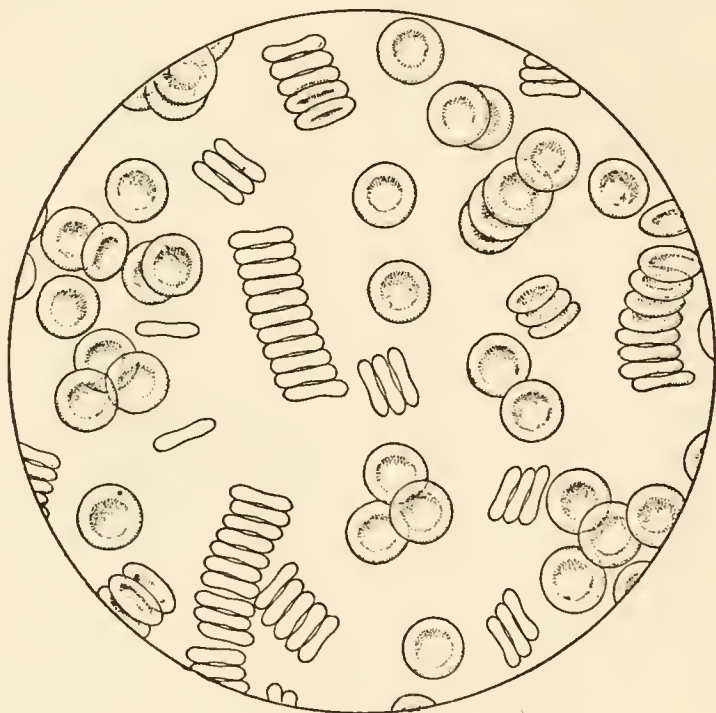


Fig. 18.—THE RED BLOOD-CORPUSCLES.

(p. 6), it is quite recognised that they exercise an immense influence in protecting the body from the attacks of germs present in the blood, for they have been seen to destroy them by flowing round and surrounding them with their bodies—devouring them, in fact—so that they are called phagocytes.

The paramount duty of the red cells is to obtain oxygen from the air in the lungs by the attractive power of their red colouring matter, and to carry this to all the tissues of the body, and there to deliver it over so that the living processes which are constantly taking place may be performed efficiently.

The next matter of importance to be considered in connection with the blood is the peculiar phenomenon called "clotting," or coagulation. If a drop of blood is drawn by the prick of a needle and placed on a microscope slide, it is seen to be perfectly fluid, but after a few minutes it becomes thick and jelly-like, and will not flow along the slide when it is inclined. This change is due to the formation of minute fibres of a substance called fibrin in the fluid part of the blood, which fibres become matted together and hold the corpuscles in their meshes, while they squeeze out the fluid on to the surface. In a state of health the blood never clots while in the blood-vessels, but if these become diseased or roughened clots are liable to form; the vessels then become blocked up, and there is great danger of portions of clot being floated off into the circulation and passing into vital parts of the body. The fact that blood tends to clot as soon as it leaves the blood-vessels is of the greatest importance in cases of hæmorrhage, for it is chiefly by this means that the torn vessels are closed and the bleeding checked. When an animal is bled to death only a portion of the blood is lost, for much always remains in the blood-vessels. Altogether the weight of blood in the body is about one-ninth of the whole weight of the animal.

The smell of blood is peculiar, and it is possible to tell from what animal it comes by the different odours. The appearance of the blood-cells also differs in different animals, varying in size, in shape, and in appearance. The blood is always alkaline, but in some diseases it is less so than in health: hence the expression "acidity of the blood," which, although not really accurate, has a definite meaning.

The blood is kept in a constant state of movement, and is driven throughout the whole body, by the power of the heart, and it is this continuous flow that is called the circulation of the blood. The circulatory organs consist of the heart and an elaborate system of branching tubes or blood-vessels.

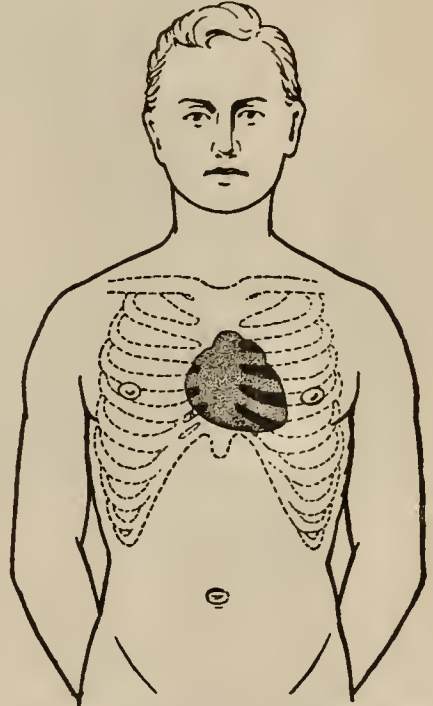


Fig. 19.—DIAGRAM TO SHOW THE POSITION OF THE HEART.

The heart is a hollow, muscular organ, weighing from 9 to 10 ounces, about the size of the closed fist, and is, as we have said, the power which drives the blood to the remotest recesses of the body through the blood-vessels. It occupies a space in the chest just behind the breast-bone, between the two lungs, rather

The Heart.

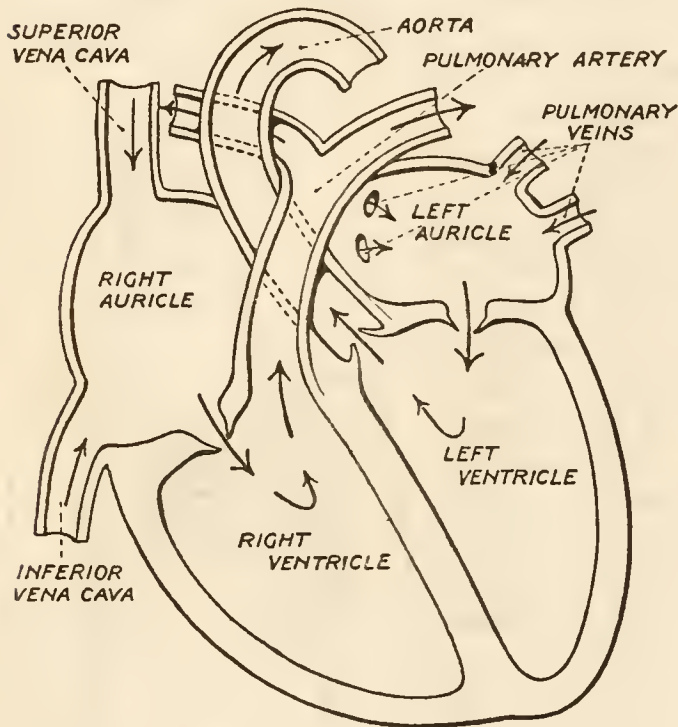


Fig. 20.—THE FOUR CAVITIES OF THE HEART, WITH THE ARTERIES AND VEINS.

the larger part being to the left of the middle line (Fig. 19). It is triangular in shape, and is placed obliquely, its point or apex being directed downwards and to the left, and its broad end or base being upwards and to the right. At a spot between the fifth and sixth ribs, just below and inside the left nipple, the movements of the heart can be both felt and seen; this is called the apex beat, and is caused by the point of the heart being driven forward and striking against the wall of the chest at each contraction.

In the early stages of development the heart is a simple tube or cylinder, a condition found permanently in some animals; but as growth proceeds this tube becomes folded upon itself in a sort of loop, and when it is fully developed the various parts have the appearance of being closely twisted together. It will help us to understand the arrangement and working of the heart if we keep the fact in view, that its original shape was that of a straight tube.

The interior of this hollow, muscular bag is completely divided into two halves, the right and the left, by a partition running across it from the base to the apex, and each half is partially divided into two by an incomplete partition, which is at right angles to the first. Thus the organ is divided into four cavities (Fig. 20), the two at the base being called the auricles, right and left respectively, and

the two towards the apex being styled the right and left ventricles. Between the right and left sides of the heart there is no communication, the partition or septum being complete, but the auricles communicate with the ventricles by openings where the partition is incomplete.

These openings are provided with valves, which consist of

Valves of the Heart. little flaps or curtains, so arranged that the blood can

only flow in one direction, namely, from the auricle into the

ventricle. The valve at the opening between the right auricle and

ventricle has three flaps, or cusps, and is therefore called the

tricuspid valve, whilst that between the left cavities has only

two, and is called the bicuspid or, more commonly, the

mitral valve, its two flaps being arranged somewhat in the shape of

a mitre (Fig. 21). The structure of these valves cannot but interest

everyone who realises that upon their efficient action and

healthy condition depend not only health but even life. The broader

ends of the flaps are fixed into a firm fibrous ring which surrounds

the opening, and their other ends hang freely in the cavity of the

ventricles, and are attached by fine cords to little muscular processes

growing from the walls of the ventricles, by which their movements

are controlled.

The left ventricle is the portion of the heart which does the chief

share of the work, and it is the strongest part, being two or three times

as thick as the right ventricle. At its upper part is the opening of the

aorta, the largest artery of the body. In the right ventricle is the orifice

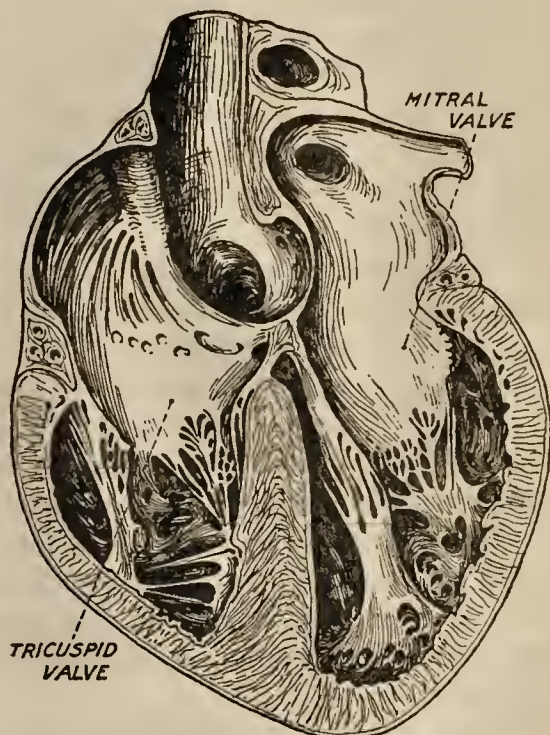


Fig. 21.—THE MITRAL AND TRICUSPID VALVES.

of the pulmonary artery, which conveys the blood to the lungs, whilst in the auricles are the orifices of the veins, those in the left auricle being the pulmonary veins, four in number, which carry the blood to it from the lungs, and those in the right the two venæ cavæ, superior and inferior, which drain the blood from the whole of the body.

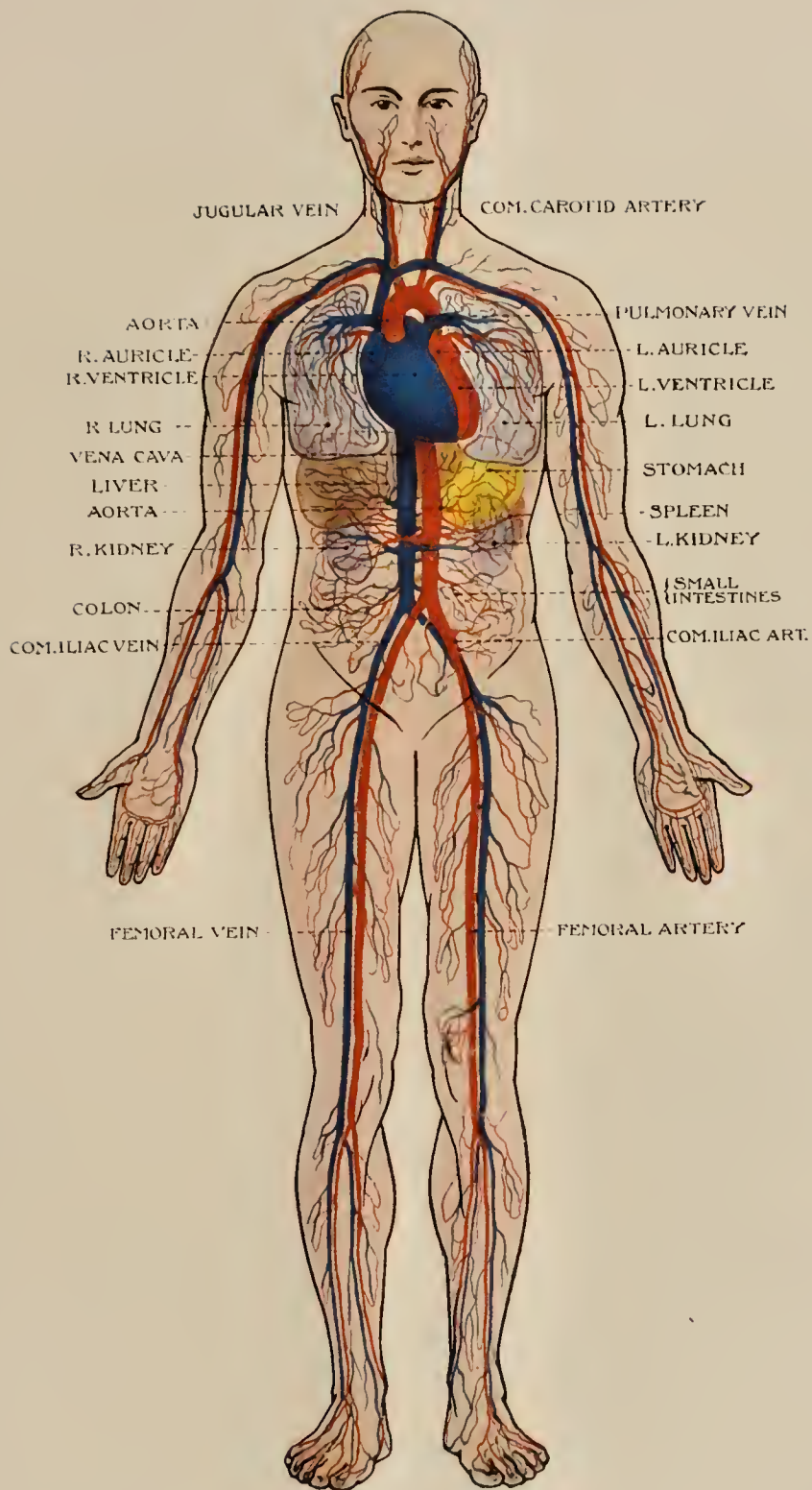
At the orifices of the pulmonary artery and of the aorta are placed valves, which are so arranged that they allow the blood to flow from the heart into the vessel, but close immediately it tends to flow in the opposite direction. These are called the semilunar valves, because they are each formed by three little crescentic pockets, the cavity of which is turned towards the artery. Whilst the blood is being forced out of the heart into the artery, the valves lie flat against the wall of the vessel, and the blood flows freely past them, but should it begin to flow back again towards the heart it would fill out each little pocket and drive it into the artery against the other two, thus filling up the whole space.

The heart hangs from its base in a fibrous bag, called the pericardium, and the adjacent surfaces of the two are covered with a smooth, shiny membrane, which is kept moist and lubricated with a small quantity of clear fluid; these surfaces glide on one another without friction during the movements of the heart's beat. In health the amount of fluid is very small, but if the pericardium is inflamed the space may become greatly distended with it.

The blood, in the course of its circulation, traverses three varieties of blood-vessels. As it leaves the heart it enters the arteries, which convey it to the tissues; in the tissues it passes through very minute vessels, called capillaries, and as it returns to the heart it flows through the veins.

The arteries—so named (from the Greek *aer*) because they were believed to contain air—are strong, thick, and elastic tubes, whose walls are made up of three distinct layers. The innermost is thin and smooth, and allows the blood to flow over it without friction or obstacle; next comes a layer of muscle, which by its contraction can lessen the size of the artery, and thus diminish the amount of blood flowing through it; the outermost layer is gifted with great elasticity, by which it retains an even pressure on the blood in the vessel, and by its recoil gradually drives it onwards in its course. The artery is surrounded with a bed of loose tissue, which allows it a certain freedom of movement. The largest and thickest artery is the aorta, attached to the heart. This gives off many branches, which divide again and again, gradually growing smaller and thinner, until they finally become so small that they are quite invisible except with a microscope.

These minute vessels are the capillaries (Fig. 22). They are formed of a very thin membrane, through which the watery part of the blood



COURSE OF THE CIRCULATION OF THE BLOOD.

THE BLOOD, PURIFIED BY ITS PASSAGE THROUGH THE LUNGS IS SEEN (RED) IN THE LEFT SIDE OF THE HEART, WHENCE IT IS CARRIED BY THE ARTERIES DOWNWARDS TO THE ABDOMINAL ORGANS AND THE LEGS AND UPWARDS TO THE ARMS AND THE HEAD. FROM THE ARTERIES IT PASSES INTO TINY VESSELS CALLED CAPILLARIES, AND THENCE (NOW BLUE) INTO THE VEINS AND SO UPWARDS AND DOWNWARDS TO THE RIGHT SIDE OF THE HEART, WHENCE IT IS PUMPED INTO THE LUNGS. THEN IT RETURNS TO THE LEFT SIDE OF THE HEART TO BEGIN ITS COURSE AGAIN.

can ooze freely, and the tube they form is sometimes so infinitesimal that it will only admit of the passage of a single red blood-cell at a time.

Capillaries. The capillaries are spread out in almost every part of the body in the form of a network, the meshes of which vary in different parts, and are particularly small in the lungs. These little vessels gradually reunite and form larger channels, called veins.

The veins have much thinner walls than arteries;

Veins. they contain less elastic tissue and less muscular fibre; they are soft, and the flow of blood through them can be stopped by very slight pressure. They are supplied at intervals with little valves, which are so arranged that the blood can only flow in the one direction—that is, onwards to the heart (Fig. 23).

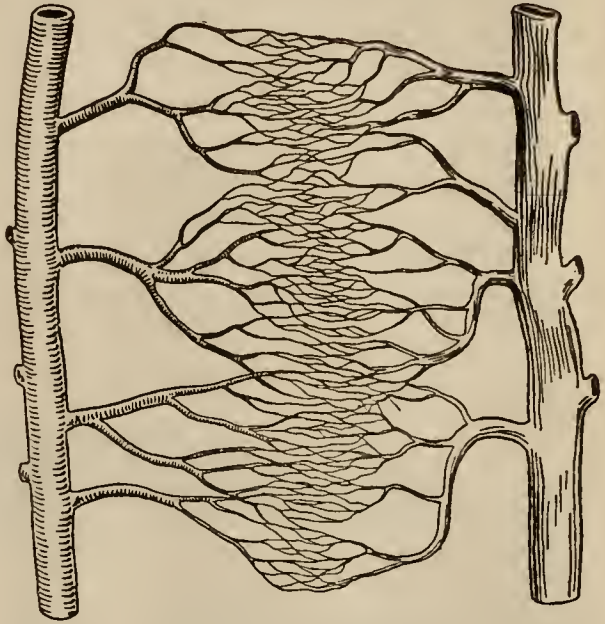


Fig. 22.—CAPILLARIES COMMUNICATING BETWEEN ARTERIES (ON THE LEFT) AND VEINS (ON THE RIGHT).

The blood passes out of the left side of the heart to all parts of the body except the lungs, and returns to the right side of the heart.

The General Circulation. Thence it is sent through the lungs back to the left side of the heart. This is called the general circulation, the various steps of which we will now follow. Its purpose is to supply the whole body with nourishment and clear away its waste material. It was not until modern days that the circulation of the blood was discovered, and even William Harvey, whose epoch-making book was published in 1628, was mystified as to what happened to the blood between the arteries and the veins. But soon afterwards the microscope showed that it flowed through the minute vessels which we have described, and which are called capillaries, and so the missing link in the process was brought to light.

The action of the heart is exactly similar to that of a force-pump; by its muscular fibres it contracts or tightens itself up on the blood it contains, and by the energy thus exerted it drives the blood through

the blood-vessels to every part of the body, however remote. The force of the heart's beat is chiefly felt in the arteries, which are over-filled and distended by the blood that is driven into them. When the contraction of the heart ceases, the elastic recoil of the arteries tends to drive the blood back into the heart, but this is prevented by the closure of the semilunar valves, and the whole force of the heart is therefore employed in driving the blood onwards through the capillaries into the veins. The flow of blood in the veins is slow but continuous, differing from that in the arteries, which is in sudden jets at each beat of the heart.

In describing the circulation of the blood we will start at the point where it flows into the right auricle from the two large veins. As soon

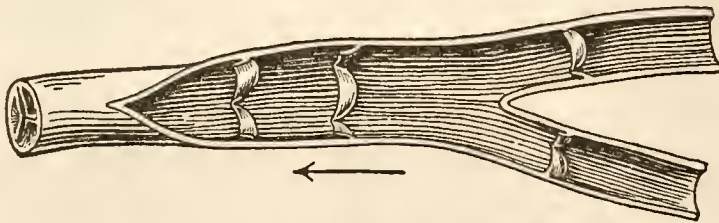


Fig. 23.—VALVES OF A VEIN.

as this cavity is fairly full the auricle contracts, and drives the blood contained in it through the tricuspid valve into the right ventricle. When this is filled it contracts in its turn, and drives the blood through the pulmonary artery into the capillaries of the lungs, any backward flow being prevented by the semilunar valve. The blood collects from the capillaries of the lungs in the pulmonary veins, and flows into the left auricle; this contracts, and drives it onwards through the mitral valve into the left ventricle, and the left ventricle, contracting, forces the stream onwards through the semilunar valves into the aorta. From this the blood passes into the smaller arteries and capillaries all over the body, thence into the general veins, and, passing into the *venæ cavæ*, enters the heart at the point from which we started our description—a complete circle having been described.

This, then, is the general circulation. But there is also another circulation, the portal system. All the blood from the stomach, spleen, pancreas, and intestinal canal passes through two sets of capillaries. The blood from these organs, instead of passing from their capillaries into veins connecting directly with the inferior vena cava, flows into a large vessel called the portal vein, which carries it to the liver, where it passes through a second

**Portal
Circulation.**

network of capillaries. In the liver the blood undergoes several important changes, and is then re-collected into veins which carry it to the inferior vena cava, whence it is conveyed to the heart. The liver, too, has a separate blood supply of its own.

The flow of blood varies in rapidity in the different parts of the circulation, and can be well compared to that of a stream. Where a stream is narrow the current is more rapid than in parts where it widens out and becomes shallow. Although the arteries grow smaller as they get further from the heart, yet their united capacity becomes rapidly greater until the capillaries are reached, and then grows rapidly smaller again in the veins as they approach the heart. The rate of the blood stream varies accordingly, and it may be somewhat roughly stated to be about a foot a second in the arteries, four inches a second in the veins, and an inch a minute in the capillaries.

The circulation of the blood is so arranged that it carries out many important duties. (1) It carries the food material which has been carefully prepared by the digestive organs to all the structures of the body; (2) it removes all the waste material produced by the body in its various vital processes—muscular energy, nerve force, etc.; (3) it acts as a carrier of oxygen from the lungs, where this element is supplied by the respiratory organs, to the tissues, which use it up in the vital processes just mentioned; and (4) it warms and moistens all parts of the body.

In carrying out these duties the blood undergoes certain important changes in its condition and composition. When it leaves the right ventricle of the heart and passes into the lungs it is dark-coloured, but when it leaves the lungs and re-enters the left side of the heart it is bright red. On the other hand, when it passes along the arteries and is supplied to the body it is red, but when it leaves the tissues of the body and flows onwards in the veins it is dark-coloured again. That is to say that certain changes occur whilst the blood is in the capillaries of the lung and in the capillaries of the body.

These two varieties of blood are called respectively arterial and venous, and the alteration in colour is only one of the changes that have occurred.

Arterial blood is fresh, pure, and ready for work, whilst venous blood is used up, and full of impurities. Analysis shows us that the blood, in its passage through the lungs, has lost a large amount of

carbonic acid gas (which is a poison and is the chief waste product produced by the wear and tear of the body), and has taken up instead oxygen from the air in the lungs. The carbonic acid gas is carried out of the lungs with the air in the process of expiration, and fresh oxygen is brought in with the next inspiration.

On the other hand, when the arterial blood changes into venous blood during its passage through the capillaries of the body, it is found to give up oxygen to the tissues, and take instead the carbonic acid which has been formed in them.

Arterial blood, therefore, fills the pulmonary veins, the left auricle and ventricle, and all the arteries, and venous blood fills the veins, the right auricle and ventricle, and the pulmonary artery.

The heart contracts in man about 72 times a minute, the contraction of the two auricles occurring at the same time, and being rapidly

The Pulse. followed by that of the ventricles. Succeeding this is a pause, during which the heart is at rest. The times occupied by these three occurrences are as the numbers 1, 4, and 6, and it is evident, therefore, that the heart rests for a longer period than it works. At each contraction of the left ventricle the blood distends all the arteries of the body, and wherever an artery is sufficiently near the surface to be felt, this impulse can be recognised by the finger. This is called the pulse. The artery at the wrist, being most conveniently situated, is usually chosen for making observations of the pulse.

The muscle of the heart is of the kind called involuntary, for it is not under the influence of the will, but is under the control of the nervous system. The rapidity and force of its beat are dependent upon nervous impulses which are constantly passing to it, and these can be altered according to the needs and demands of the body. Many alterations which occur in disease are the result of some interference with this nerve-control : for instance, the occurrence of fainting from pain or fear, and the palpitation and rapid pulse of fright. The general circulation also is regulated and controlled by the nervous system. When any organ requires a larger amount of blood to carry on its duties, it obtains it by reference to the nervous system. When, for instance, the brain is engaged in active work, it is supplied with a large amount of fresh blood by a dilatation of the arteries going to it, whilst during sleep the brain is pale and bloodless owing to a contraction of the same vessels, the processes being performed by their muscular fibres.

**The Nervous
System
and the
Circulation.**

CHAPTER X

DISORDERS OF THE HEART

Organic and Functional Affections—Organic Heart Diseases : Pericarditis—Myocarditis—Endocarditis and Valvular Disease—Functional Heart Diseases : Alterations of Pulse—Irregular and Intermittent Pulse—Lividity or Cyanosis—Pain in and about the Heart—Syncope—Palpitation—Heart Weakness : Fatty Heart—Fever Heart—" Broken Heart "—Angina Pectoris.

A FEW general remarks on heart affections are necessary before treating of the special complaints in detail. It is well, first of all, to remember that the various diseases of the heart are difficult to recognise without medical knowledge and the capacity to use the stethoscope and interpret the information obtained by means of it. The mechanism of the heart is so delicate, and any imperfection in its action so important, that it is always wisest, when suffering from any symptom which may indicate heart disease, to have the matter cleared up without delay by consulting a doctor and having the heart examined.

The various affections of the heart must be divided into two categories : (1) those in which there is some definite change of structure in the tissues composing the heart, and (2) those in which there is only a disturbance of the nervous arrangements which govern its action and control its functions. The first class are called the organic or structural diseases, and the second the functional diseases.

Now the first class includes many serious affections which, if neglected, may end fatally, and yet it is just these complaints which in their early stages show so little sign of their presence. It is not at all uncommon for persons to have some organic disease of the heart, especially some imperfection of one of the valves, without having their suspicions excited by any definite symptom. In such cases the affection is only discovered accidentally when undergoing a medical examination for life insurance or some passing ailment.

On the other hand, the far less serious functional complaints are often accompanied by the most distressing and alarming symptoms, which send the sufferer precipitately to see the doctor. As functional

diseases are far more frequent than organic, the result of the consultation is usually satisfactory, and the patient goes away with his mind at ease, having been told that his heart is free from disease, and that by avoiding some slight indulgence or indiscretion, and carrying out simple remedial measures, his alarming symptoms will all subside.

However, it must not be forgotten that the same symptoms are common to both classes of heart trouble, and we shall therefore describe the various affections, with their causes and symptoms, in the hope that the reader will be enabled to distinguish the serious from the unimportant ones, and, having done so, to treat the latter successfully with the simple measures recommended, and to seek skilled assistance for the former without any loss of time.

ORGANIC HEART DISEASES

The three chief causes of organic heart disease affect persons of different ages. In children it is *congenital* in origin—that is, the child is born with some malformation of the heart. The changes in the structure of the heart which ought to have taken place at birth do not occur, and as a result the circulation is carried on imperfectly. Such children usually live but a short time. In young adults and middle-aged persons *rheumatic fever* is the most common cause of the organic heart disease. In old age it is *degenerative* changes in the heart and large blood-vessels which are chiefly met with as the causes of disease; and, lastly, heart disease is not uncommonly the result of *severe strain*, and affects those whose occupations necessitate violent exertion, such as athletes, gymnasts, and manual labourers.

INFLAMMATION OF THE HEART

The one organic disease of the heart which it is necessary for us to consider is inflammation. This may affect the sac surrounding the organ, when it is called *pericarditis*; or the muscle of the heart itself, *myocarditis*; or the lining membrane of its cavities, *endocarditis*; and as each of these produces special symptoms, each will require separate consideration.

The chief cause of inflammation of the heart is exposure to cold, and the exposure is particularly liable seriously to affect those who have rheumatic tendencies. As we have already mentioned, acute rheumatism is a really dangerous disease, because of its great tendency to involve the heart. Why this is so is not understood, but rheumatism is a disease of the joints, parts which are subject

to constant movement, and the heart, with its continuous action, may almost in this respect be looked upon as a joint. Inflammation of the heart also complicates many of the acute feverish illnesses, such as scarlet fever, measles, and blood poisoning (pyæmia), or may be set up by inflammation spreading from other parts.

In pericarditis there is fever, with pain and tenderness over the heart; fluid is poured out, and distends the sac of the pericardium, and gradually the action of the heart becomes impaired, and the pulse grows weak, rapid, and irregular. Under appropriate treatment the symptoms subside, and the fluid disappears, although the two surfaces of the pericardium are very liable to stick together and become permanently attached. The recovery is slow, and ill-health may continue for a long time; in severe cases death may result from faintness or exhaustion.

In myocarditis, or inflammation of the substance of the heart, there are very irregular and impaired action of this organ, great weakness of pulse, tendency to faint, and serious danger to life. Even after recovery the heart is left in a weakened state for a long time.

In endocarditis the symptoms are very indefinite, and those of the disease producing it often completely overshadow them. There is but little pain and no fever, but gradually the valves become involved, and their affections can only be discovered by the skilled use of the stethoscope.

Endocarditis and Valvular Disease.

When a healthy heart is listened to with a stethoscope, or with the ear against the chest, it is found to produce a distinct sound with each beat, and on closer examination this can be definitely divided into two parts, which can be imitated, according to books on physiology, by saying "lubb-dup." The first is a long, dull sound, and the second is a short, sharp one. These are called the "heart sounds," and they are caused by the sudden shutting of the valves by the current of blood being forced against them. The first sound occurs at the moment when the ventricles contract, and is due to muscular contraction and to the closure of the valves between the auricles and the ventricles—that is, the tricuspid and mitral valves. The second sound is caused by the elastic recoil of the large arteries shutting up the semilunar valves. In disease of the valves these sounds are altered, or they may even be replaced by a purring sound caused by the rush of blood through an imperfectly closed valve. The abnormal sounds are called "murmurs," and it is by these murmurs

that a doctor can recognise which valve is diseased and what form the disease has taken. The particular valve is known by the situation in which its murmur is most distinctly heard, and the form of disease—whether contraction of the orifice or imperfect closing—by the time in the cycle of the heart's action at which it occurs.

These remarks are sufficient to show how interesting and yet intricate is the examination of the heart, but it would be unprofitable to pursue the subject farther, as it is beyond the scope of the domestic treatment of disease.

The symptoms of valvular disease of the heart may now be briefly considered. The first to appear are in connection with the heart itself. There is pain in the organ, and a feeling of distress in the heart region. The power of the heart as a pumping machine fails, and as a result the pulse grows rapid, weak, and irregular; palpitation and shortness of breath set in, especially on slight exertion; attacks of giddiness and faintness become more and more frequent. The interference with the circulation of the blood due to heart weakness comes on gradually; the arteries become empty and the veins full; the various organs are gradually congested with blood. Congestion of the lungs produces cough and blood-spitting; of the liver, swelling of the abdomen from dropsy; of the stomach and digestive organs, indigestion and malnutrition; of the kidneys, scanty urine containing albumen. Finally, general dropsy of the body may develop, first appearing in the ankles; and blueness from imperfect aëration of the blood may occur in the later stages.

If many of these symptoms are present together they show that the heart is diseased, but when only one or even a few of them exist they are not sufficient to prove it, as they may be produced in other ways, as will be seen later.

Fortunately, our bodies are provided with a wonderful power of accommodation to circumstances, and a heart whose valves are diseased does not always fail so lamentably in its duties, and the above chain of symptoms may never show themselves.

The imperfect action of the valves throws extra work on the heart, and often the muscles of this organ rise to the occasion, and the increased work develops them to such an extent that power is increased proportionately. This is called *compensation*. If the compensation is sufficient everything may go on in the body as if there were no valvular disease. When the muscle of the heart becomes developed in this way, a part of it, or even the whole heart, grows thicker,

firmer, and larger, and we speak of the condition as *hypertrophy of the heart*.

But there are, unfortunately, some cases in which this hypertrophy does not take place. For muscles, to develop as the result of use, must be supplied with plenty of nourishment; the body must have plenty of reserve strength and stamina, and if these are absent the muscles, instead of developing and growing stronger, become soft and flabby, exhausted and overworked, and the heart grows thin, weak, and much enlarged, and *dilatation of the heart* is the result.

Dilatation is the beginning of the end; the various symptoms we have mentioned rapidly develop, and the patient dies in a state of exhaustion.

Treatment of organic heart disease depends first upon the cause, which in most cases is rheumatic fever, the heart trouble coming on as a complication during the attack. In the early stages **Treatment of Organic Heart Disease.** leeches to the heart region may be required, or counter-irritation by poultices, blisters, or iodine, with absolute rest in bed, and all the general care and attention of a severe acute disease. In the later stages every means must be used to maintain the physical strength and the healthy working of all the organs, especially those engaged in the digestion and supply of nourishment. Rest in bed must be continued, and massage may be employed with advantage to develop the general tone of the body, encourage the circulation, and increase the appetite.

After acute symptoms have all subsided, much may be done to encourage the muscular development of the heart by drugs, diet, baths, and regulated exercise, alternating with periods of complete rest. This treatment has been much employed at Nauheim, and has received the name of the Nauheim treatment, or the Schott treatment, from the doctors who developed it into a system.

The treatment of organic heart disease by drugs depends so much upon the patient's condition, as well as on the state of the heart, that it is hardly safe to give any definite directions. Tonics are very useful, especially iron and strychnia, and drugs which act directly on the heart, such as digitalis and caffeine, are generally required, but must be ordered by a doctor, as in some cases they are injurious.

FUNCTIONAL DISORDERS OF THE HEART

These affections may occur when the muscular system, including the heart muscle, is weakened by general debility, or be brought on

by exhaustion of the nervous system, by over-exertion, mental fatigue, want of nourishment, mental shock or distress. They may be produced by the unhealthy conditions of the blood which occur in anæmia and in the opposite condition, or plethora. Gout also must be looked upon as a very common exciting cause of functional heart trouble, and probably only second in frequency to indigestion. Acidity, flatulence, improper food, too much food, intestinal worms, constipation, and indigestion generally are the conditions which act on the heart through the digestive organs, and must always be suspected when unusual symptoms affecting that organ are experienced. Last, but not least, we must mention certain substances which must be looked upon as boons and blessings to some men, but are poisons to others—tea, coffee, and tobacco. If used to excess, or even in moderation by certain predisposed persons, these produce the most alarming symptoms of heart disturbance and irritability.

ALTERATIONS OF PULSE IN HEART AFFECTIONS

The normal number of heart-beats, or the pulse rate, is 70 to 75 per minute. As the heart's action is controlled by the nervous system, we can easily understand that many alterations of the pulse are due to nervous influence, and such emotional disturbances as anger, fright, or excitement may increase its rapidity to an extraordinary degree. This is so well recognised that a doctor would not be at all surprised to find the pulse as much as 10 beats or more above the normal at his entrance into a patient's room, and yet perfectly normal when taken after a short time.

In conditions of debility and poorness of blood the pulse-rate is raised, and in all feverish diseases; indeed, increased rapidity of pulse is considered one of the usual symptoms of fever. Before the clinical thermometer was invented, physicians used to reckon the height of the fever by the rapidity of the pulse, and a fairly accurate guess at the temperature can be made by allowing an increase of 10 beats of the pulse to each degree of the temperature, for the temperature and pulse, in most diseases, rise and fall together. In cases of very high fever the pulse may rise to 150 or even 200 a minute, and it is then almost impossible to count the number or recognise one beat from another. On the other hand, a very slow pulse is sometimes met with in persons recovering from severe illness, also in certain diseases of the brain, especially after a severe injury which has caused concussion or stunning. It occurs also in certain diseases of the heart.

Too much account must not, however, be taken of the number of pulse-beats a minute if no other symptoms of disease are present, for many persons have as an individual peculiarity either a very slow or a very quick pulse, even when they are in perfect health. Many men who have gouty constitutions have very slow pulses all their lives, and even when they are attacked by fever the pulse is not as quick as other people's. A slow pulse is also usually present in persons who have suffered for some time from jaundice. A patient who has once discovered that his pulse is unusually quick or slow in health should remember to tell his doctor of the peculiarity, as he may be caused unnecessary alarm by what is apparently a serious symptom.

In heart disease the pulse is almost always affected in some way or other. If the heart is weak and its power failing, the pulse grows correspondingly *weak and rapid*, but if the heart is maintaining its strength the pulse will be *full and strong*, and this is especially noticeable when the muscle of the left ventricle has become hypertrophied. A peculiar pulse is also present when the aortic semilunar valve is deficient and allows the blood to flow back into the ventricle. It has received the name of *water hammer*, because it is felt as a sudden throb which rapidly passes and is followed by a sensation as if the flow had suddenly turned backwards.

Other peculiarities which are met with are the *irregular* pulse and the *intermittent* pulse. In the former some of the beats are felt more distinctly than others; some are strong and firm, whilst others are weak or perhaps not felt at all. In the latter one or two beats are missing, producing what is termed an intermission, and these intermissions may be at regular or irregular intervals. Although these conditions are frequently present in heart disease, they are no proof of its existence, for they are also caused by much less important troubles, and may be set up by the gouty poison, by indigestion, constipation, flatulence and acidity, by nervous excitement and overwork. The excessive use of tea and coffee, from the presence of their active principle caffeine, and of tobacco, from the poisonous substance nicotine, is often attended by these symptoms, and if the warning is not attended to much serious trouble may follow. Some persons have an intermittent pulse in perfect health and without being aware of it, but at other times it causes most distressing sensations, and may give rise to a feeling as if the heart stumbled in its work, or to an intense oppression as of impending death, with severe pain.

In cases in which these troubles are purely functional and unaccom-

panied by organic disease, recovery in a short time is almost certain with proper care. The treatment of abnormal conditions of the pulse depends on the exciting cause, and must be directed to the removal of this by the appropriate measures which are described elsewhere; but it is important, when any of these conditions arise, to make quite certain of the cause, and, if this cannot otherwise be done, to consult a doctor and find out if the heart is diseased or healthy.

LIVIDITY OR CYANOSIS

Lividity, or blueness of the surface of the body, is a common symptom in heart disease. It is met with in its most marked degree in infants born with malformed hearts, and the term cyanosis, or the blue disease, is sometimes used to designate that condition.

In the remarks on the circulation it was explained that the blood became blue from the loss or absence of oxygen, and the occurrence of blueness in heart disease can be explained by this fact. If the heart's action is so impeded that the flow of blood through the lungs is carried out imperfectly, the exchange of gases which there takes place is inefficient, and blue blood is carried on into the arteries and driven onwards throughout the body. Affections of the lungs also produce this symptom, for they interfere with the free introduction of fresh air into the chest, and thus the blood is deprived of its oxygen. The symptom is very characteristic of asthma, in which there is a greatly diminished flow of air into the lungs, and of inflammation of the lungs from a large portion of lung being solid and airless. Blueness is a marked symptom of suffocation and of severe collapse in such acute diseases as cholera.

This is, therefore, but a symptom of many complaints, and its causes must be removed by treatment; but much benefit may be obtained—treating the symptom by itself—by the inhalation of oxygen gas. So long as this can enter the air-cells of the lung it will there meet with the blood and be seized upon greedily by the red cells, and in the course of a few minutes the benefit of its presence will be manifest.

PAIN IN AND ABOUT THE HEART

Pain is sometimes felt in the heart when this organ is diseased, especially if the disease be inflammatory, but in the great majority of organic affections of the heart there is little or no pain, and when pain is felt in the heart region it is almost always due to trouble with some

other part or organ. The simple fact that pain is felt is a reason for thinking that the heart is not the seat of disease.

What, then, are the conditions which cause pain in the heart region? The most common of all is muscular pain, or myalgia, which is the result of debility, and is likely to occur in anyone who is run down and out of health. It is very often met with in weak and sickly women who are reduced by prolonged nursing, by worry, or by want of nourishing food. Pain in the left side may also occur from over-exertion and strain of a muscle, or from the violence of a bad cough. The symptom causes much anxiety and nervousness from the suspicion of heart disease, but it soon disappears under the influence of good food, tonics, and a belladonna plaster.

A similar pain is common in rheumatic persons from chill, and in the early stage of shingles, before the eruption has appeared.

The next most common cause of pain in the left side is some digestive trouble, caused by excess of acid, by wind, or by an indigestible meal. Heartburn, a symptom of dyspepsia, was at one time known as cardialgia or heartache, from the popular impression that it was the heart that was affected.

In many of the functional affections of the heart pain is felt, but, as we have already explained, these are not due to heart disease.

SYNCOPE

A fainting fit (or, as it is technically called, an attack of syncope) is produced by the sudden failure of the heart's action, and a consequently deficient supply of blood to the brain. In the majority of attacks there is nothing seriously amiss, but faintness may be a symptom of heart disease, and affections which tend to produce it are those in which the heart becomes muscularly weak—all affections of the valves in which the circulation is much impeded, and in which the heart becomes dilated and thinned. Many causes, too, may act on the heart from without. The collection of fluid in pleurisy on the left side, a tumour of the chest or abdomen, and the habit of tight lacing may all, by pressure on the heart, impede its action.

Anæmia, or bloodlessness, causes great weakness, and starves the heart. In this condition the blood is poor, watery, and wanting in the red oxygen-carrying material, and as a result extreme debility is produced, with a weakened heart and feeble circulation. In such circumstances very slight exertion is followed by fainting.

Anyone may faint who is suffering from debility, whether caused

by illness, hunger, hæmorrhage, or physical exhaustion, and many conditions affecting other organs of the body act indirectly on the heart through the nervous system. Acute pain may have such an effect, especially when it is accompanied by fear or suspense. Excessive heat may produce syncope, and for this reason it is dangerous for those who are liable to such attacks, or whose heart is not strong, to take very hot baths; if attacked with faintness in such circumstances, even life may be lost.

A fainting fit lasts a variable time, but in the majority of instances it soon passes off if proper measures be adopted to restore the circulation. The pulse, which during the faint was hardly perceptible, gradually improves, the shallow breathing ends in a long-drawn sigh, the consciousness slowly returns, the face recovers its natural colour, and the attack is over.

In the fainting of severe hæmorrhage, in which it is impossible to restore the circulation rapidly, one attack is likely to follow another with but short intervals, the patient lies in a semi-conscious state, constantly tossing from side to side, the restlessness is very characteristic, and in bad cases it may be accompanied with delirium and even convulsions.

It is important to distinguish an ordinary fainting fit from some conditions which cause somewhat similar symptoms. The disappearance of the pulse, gradual loss of consciousness, limp and motionless limbs, are unlike an epileptic fit; the loss of colour and pulse unlike hysteria; the loss of power on *both* sides unlike a paralytic stroke; and the absence of injury distinguishes fainting from stunning.

The treatment of fainting should be known to everyone, as it is perfectly simple, and yet there is nothing about which people seem so ignorant. The commonest thing for them to do is to

Treatment. stand the patient up and try to make her walk, which is about the worst treatment possible. The first thing to do is to place the head on a level with the heart, and this can be done either by laying her down flat on the ground or, if she is sitting in a crowded room, by pushing her head well down between her knees. In this way the blood is made to flow into the brain, and consciousness rapidly returns. Next undo the clothes around the neck and chest, as any constriction round these parts interferes with the heart's action; give a few sips of cold water, and sprinkle some on the face; it is not necessary to smother her with water—a few drops are quite sufficient. Smelling-salts are also useful, as they tend to increase the flow of blood to the brain; a tea-

spoonful of sal-volatile with half a wineglassful of water, or some spirit and water, does the same. Fan the face, keep the patient cool, and as far as possible prevent persons crowding round, for plenty of fresh air is a good restorative. Be careful not to allow the sufferer to stand up too soon, as this may bring back the faintness directly, and all your trouble will be wasted. If the fit is of long duration send for a doctor, for although the great majority of cases are of no importance, a few are due to heart disease, and it is well that a doctor should decide this important point and direct the necessary measures of treatment. In the most severe cases artificial respiration or the electric battery may be resorted to.

When the faintness is brought on by hæmorrhage it is, of course, essential that this should be stopped at once, and there is not the slightest good in treating the faintness until all bleeding has ceased.

To prevent a recurrence of the attacks attention must be given to the general health. The patient must live wisely, take plenty of outdoor exercise and nourishing food, must give up idle habits and late hours. A good sponge bath of a morning, as cold as can be borne, is decidedly beneficial. The causes of the tendency to faint must be sought, and the various measures necessary for their removal must be carried out assiduously.

PALPITATION OF THE HEART

Is the condition in which a person becomes aware of the beating of his own heart. As a rule we are quite unconscious of the movements of the heart, but at times its beats are so powerful, or so frequent, that they make themselves felt, and the sensation is in many cases troublesome and alarming.

This condition is most commonly met with in persons of an excitable and nervous temperament, or in those who are suffering from general debility or exhaustion, either bodily or mental. It usually affects young persons from fifteen to twenty-five years of age, and more frequently women than men.

Organic diseases of the heart are often accompanied by this symptom, but in its most common form it is a functional disorder, and is due to a disturbance of the nervous machinery of the heart, by which the normal control is lost and the heart runs riot. The heart, therefore, may be affected through the nervous system indirectly, or by the blood directly, or by affections of other organs.

Causes.

The nervous exciting causes are those which produce mental excitement or shock, such, for example, as sudden surprise, anxiety, or fear.

The conditions of the blood which cause a liability to palpitation are of two distinct and opposite kinds. When the blood is abnormally rich and stimulating, and contains large quantities of waste material, it may irritate the heart and disturb its action. This is what we call a state of plethora, and is sometimes met with in full-blooded and gouty persons. We must therefore look upon gout as a predisposing cause of palpitation. In the opposite condition, in which the blood is poor and watery, as in severe anæmia, the heart is imperfectly nourished, and becomes easily disturbed in its action, and palpitation is set up. Anæmic girls are greatly troubled by this symptom, and can experience no excitement nor make the slightest exertion without an attack coming on.

Again, the blood may act injuriously on the heart by carrying to it poisonous substances introduced from without, and these poisons are amongst the commonest causes of palpitation. They are tea, coffee, and tobacco. It is hard to believe that these pleasant indulgences, which we have learnt to look upon almost as necessities in our daily life, contain powerful poisons; and yet the theine of tea, the caffeine of coffee (which are very similar in composition), and the nicotine of tobacco are most active drugs, and if the substances containing them are indulged in to excess, palpitation is exceedingly likely to be set up. But excess is an elastic term, for some people suffer from very much smaller doses than others. It is always wise, when afflicted with palpitation, to try the effect of discontinuing the use of these luxuries. If the heart trouble then ceases the cause is discovered, and the cure of the complaint only requires some self-denial.

Of the affections of other organs that produce palpitation, none is so common as are those connected with the stomach and other digestive organs. It may, indeed, be the only symptom of their presence, but more commonly such conditions as flatulence, excessive acidity, with pain, discomfort, and a sensation of fulness, are also present. Intestinal worms, especially tape-worms, are said to cause palpitation by the irritation of the bowel which they set up.

Lastly, pressure on the heart from tumours, from dropsy of the abdomen, or from tight lacing, by interfering with its movements, may produce this trouble.

We will now consider the sensations experienced during an attack of palpitation.

The sufferer is oppressed, uncomfortable, and anxious; the heart seems as if it were turning over in the chest or bounding upwards into

Symptoms. the throat; both it and the large arteries are felt throbbing violently. The pulse is irregular, a few rapid beats being followed by strong and slow ones. The breathing is oppressed; a lump rises up in the throat, threatening suffocation; there are giddiness, noises in the ears, interference with the sight, specks floating before the eyes, and a bursting sensation in the eyeballs. The face is flushed, the skin moist with perspiration; a partially unconscious condition may ensue, or even a true fainting fit.

This train of symptoms may well excite alarm, and seem to show the existence of serious heart disease, but in the majority of cases there is no danger, and after a time the trouble subsides.

The attacks last for a variable time, from a few minutes to several hours, and are very liable to return again and again unless the cause is discovered and remedied. In organic heart disease palpitation may become more or less persistent.

As it is of great importance to distinguish between the palpitation of organic heart disease and that which is merely a functional disturbance, we will add Aitken's table showing the most important points of difference:—

PALPITATION

With organic diseases of the heart

1. Usually comes on slowly and gradually.
2. Is constant, though worse at times.
3. Is accompanied with blueness of lips and cheeks, congestion of face, swelling of legs.
4. Heart action not necessarily quicker.
5. Palpitation often not much complained of by patient, but occasionally attended with severe pain extending to the left shoulder and arm.
6. Palpitation increased by exercise, stimulants, and tonics, but relieved by rest.
7. Is more common in men than women.
8. Beat felt in cardiac region, stronger, heaving, and prolonged.

As a functional disorder of the heart

1. Generally sets in suddenly.
2. Is not constant; entirely absent between attacks.
3. Is not accompanied with blueness or swelling, face often pale.
4. Heart action usually quickened.
5. Palpitation much complained of by patient, often with pain in left side.
6. Is increased by sedentary occupation, but relieved by moderate exercise, stimulants, and tonics.
7. Is more common in women than men.
8. Beat abrupt, not heaving or prolonged, fluttering sensation at the pit of the stomach.

The treatment of palpitation, of course, depends to a great extent upon its cause, and we have described pretty fully the various points of difference between the organic cases and those which are purely functional for that very reason. If after reading this description you still have doubts in your mind, it would be well to consult a doctor before proceeding to treat yourself. If you have never had rheumatic fever, and have no other reason to think your heart is affected, it is most probable that your palpitation is functional, and that treatment will entirely remove it. Anyhow, do not excite yourself about it, because, as we have explained, mental conditions of worry and anxiety are enough to cause the trouble, and will certainly make it worse. If gout, anæmia, or debility is present, it must be relieved by colchicum, iron, and tonics; if plethora, by saline aperients and low diet. If there is dyspepsia, flatulence, or acidity, employ the treatment recommended elsewhere, and clear the bowels well with an aperient pill. If yours is a nervous temperament, live a quieter life, avoid excitement, take simple, plain food, daily healthy exercise, and plenty of fresh air. If tea or coffee, tobacco or alcohol may be the cause, give each up in turn until you find which is the offender, and then treat it as poison. After the palpitation is gone, be careful how you take up the indulgence again. If tea was the cause, take it weaker and quite freshly made, and only once a day; if tobacco, smoke less, use a lighter kind or a milder brand of cigar. Above all, use common sense.

During an attack lie down and keep quiet, loosen anything tight round your neck and chest, and see that you have plenty of fresh air. Take a little stimulant, such as brandy and water or a teaspoonful of sal-volatile and water. A soda-mint tabloid or two, or half a teaspoonful of bicarbonate of soda in hot water sometimes gives relief. A belladonna plaster, about 6 by 4 inches, to the heart region, sometimes does good and relieves discomfort.

HEART WEAKNESS

The suspicion that they have a weak heart is an ever-present dread in the minds of many, which makes them miserable and gives every little symptom that might point to heart disease—such as a pain in the left side, a little flutter or uncomfortable feeling in that region—an exaggerated importance. In point of fact, it is usually just those who are particularly anxious on this matter who are quite free from it, and are only suffering from nervousness. But a weak heart is a

definite complaint, and occurs as the result of perfectly well understood conditions. In feverish or exhausting illness, and in many forms of organic heart disease, the muscles of the heart become weakened, just as all the other muscles of the body may.

A weak heart means a weak circulation, with poor pulse and cold hands and feet. The feebleness of the circulation can be shown by pressing the finger on the skin of the part and watching how much more slowly the blood returns into it than in the case of a person who is strong and healthy. The effects of a weak heart are evident in the sufferer's appearance, in his manner, in his general feebleness, in his breathlessness on exertion, and in his tendency to faint.

On the other hand, there is no doubt that some people's hearts are too strong—a strange statement, perhaps, but perfectly true of many old people and of those who are prematurely aged. The heart may be too strong for the rest of the body, and especially for the arteries, which may be so weakened by disease as to be unable to bear the strain of a strong, active heart; the weakened vessels become softened and stretched, and the disease called aneurism is the result; or they may even burst and cause internal hæmorrhage, one of the most common forms of this disaster being apoplexy, or bleeding into the brain.

A fatty heart is one form of weak heart, and is said to be one of the chief causes of sudden death under an anæsthetic. It seldom occurs in persons under sixty years of age, unless some severe or wasting disease is the cause. The symptoms, apart from those of weakness of the heart's action, are very indefinite, and many cases are never recognised during life.

Another form of weak heart occurs in diseases accompanied by very high fever, and may be called the *fever heart*. Although in slighter degrees it may be present in all highly feverish diseases, it is chiefly of importance in those affections which are caused by powerful poisons—such, for instance, as typhus, typhoid fever, diphtheria, septicæmia, and influenza. The muscular fibres of the heart become swollen and softened, and the heart becomes enlarged, soft, and weak. The treatment of this condition is the same as for the fever which causes it, but there is one lesson which we must learn from the knowledge that feverish diseases produce a weak and flabby condition of the heart, which is that it is of great importance to be careful about the first getting out of bed and moving about. If, for instance, after a sharp attack of influenza which subsides rapidly we immediately

get up and move about, we are liable to overtax and strain a weakened heart, and may in this way lay the seeds of much future trouble, and perhaps start heart disease. It is necessary to stay in bed, after feverish illness, until the rate of the pulse has fallen to its normal number. Cases are not uncommonly met with in boys at school and youths where the heart is strained by violent exercise and rough games. In many instances this is really the result of neglect of the precaution just mentioned: an attack of influenza has been treated lightly, and active exercise has been taken too soon.

Rupture of the heart is a condition which sometimes occurs, but is far more often spoken of as "a broken heart," an expression which is evidently a remnant of the old superstition that this organ is the seat of the affections. A healthy heart never breaks, but a diseased one may, and fatty disease is the most common cause, the actual tear being brought about by some great mental excitement or sudden violent physical effort.

The heart may be also torn by a direct injury with a knife or sharp weapon, and the result in most cases is rapid death. But even this accident is now coming within the domain of surgery, for many cases have been reported in which the surgeon has been able to stitch up the wound in the heart, and the patient has made a satisfactory recovery.

Death in heart diseases may be sudden or gradual. In the latter the power of the heart gradually fails, and the patient dies from exhaustion. In the former the fatal result is due either to rupture of the organ, as in fatty heart, or to the sudden tearing of a valve. The majority of cases of sudden death that are reported are probably the result of sudden failure of the semilunar valve at the orifice of the aorta.

ANGINA PECTORIS

Angina pectoris, or "breast pang," is sometimes due to an affection of the *nerves* of the heart—heart neuralgia; in other cases to a cramp of the heart *muscles*. It is chiefly met with in men over the age of fifty who lead sedentary lives. It is one of the conditions produced by various organic diseases of the heart, and comes on in the course of inflammation or degeneration of the organ and its valves. Many cases are traced to disease of the coronary arteries—the nutritive arteries of the heart—these vessels being affected with the complaint called atheroma, so that their walls become hardened and inelastic, and the supply of blood through them to the heart's walls much restricted. Although the restricted supply may be sufficient for the ordinary, quiet,

everyday work of the heart, it is not so when any sudden strain or demand is put upon the organ. When this occurs the muscles become rapidly fatigued, and cramp and neuralgia follow, with all the symptoms of an attack of breast pang.

The exciting causes of a spasm, therefore, are anything that throws a sudden strain on the heart, such as mental excitement, anger, severe pain, or unexpected pleasure; also active exercise, sudden movement, exposure to a blast of cold air, or an indigestible meal.

The attack comes on suddenly, with intense pain and constriction in the region of the heart, the pain radiating over the chest and abdomen, and spreading to the left shoulder and down the left arm.

Symptoms. With the pain is a sense of intense anguish and dread; the face becomes pale, cold, and bathed in a clammy perspiration; there is a feeling of giddiness and faintness, and the patient stands rigid and half conscious, holding on to anything within reach to prevent himself from falling. The attacks vary much in intensity and duration, sometimes being almost momentary, at other times being prolonged, on and off, for hours.

Although in many cases breast pang is a functional condition, and free from danger, it is often a symptom of established heart disease. Occasionally it begins without anything being wrong with the heart, but disease of the organ gradually makes itself manifest, so that even the mildest attacks should receive careful attention, and a thorough examination of the heart should be made.

The effects of treatment during an attack are most satisfactory, and great relief can be obtained if the proper drugs are kept handy and are employed. First of all the patient should be encouraged, and his terror relieved by sympathy. He should be allowed to put himself into whatever position he feels most convenient, and then, if the cause is known, this should be relieved without delay. If the stomach is at fault, and is full of undigested food, an emetic of mustard and water (a tablespoonful to half a tumblerful) should be given at once; when the stomach is emptied the symptoms will subside. If the cause is flatulence or acidity, a teaspoonful of sal volatile in two tablespoonfuls of water, or a couple of soda-mint tabloids, will give relief. If exposure to cold has brought on the attack, put the hands and feet into hot water, apply hot bottles to the body and a hot linseed poultice to the chest.

But if the actual cause is unknown we must use one of the remedies which subdue spasm, and which we know by experience will relieve

angina. The first of these is a drug called nitrite of amyl, the value of which in this affection was discovered by Sir Lauder Brunton, and without which no one would attempt to treat a case which is at all severe. If a few drops of this powerful drug are inhaled, the small blood-vessels throughout the body become enlarged, as is shown by flushing of the face. The effect of this is that blood is drawn away from the heart, the blood pressure is lowered, and the heart is relieved from its suddenly increased labours. So rapid and certain is its action that patients learn to put the utmost confidence in it, with the full conviction that they can cut short an attack at will. The drug is, however, troublesome to carry about, and loses its power rapidly if exposed to the air, though this difficulty has been overcome in a great measure by enclosing it in little glass capsules encased in cotton-wool and silk, each capsule containing from 3 to 5 drops. The victim to angina should always carry these capsules in his pocket; when the attack comes on he places one in his handkerchief, crushes it, and inhales the vapour. It is a very powerful drug, and must be used with caution, as an overdose may cause suffocation, convulsions, or even death. However, when used in capsules there is no danger of an overdose.

A drug which has a similar action is nitro-glycerine, of which the effects are less rapid but more lasting. It is a dangerously explosive substance, but is sold in the form of tablets mixed with chocolate, and is then perfectly safe and suitable to carry in the pocket. The dose is $\frac{1}{100}$ grain, and this is contained in each tablet, one of which should be well masticated and swallowed immediately an attack of angina threatens.

Between the attacks preventive treatment must be adopted, and it is most important to avoid all those conditions that are likely to bring on a paroxysm. A short period of rest should always follow every meal; gentle exercise should be taken every day, without carrying it to fatigue; cold baths are really dangerous, and should on no account be indulged in, and in most cases smoking should be entirely given up. Some benefit may be obtained from massage of the right half of the chest and rubbing it with a stimulating liniment.

The diet, as we have seen, will require particular attention. It is advisable to give up altogether tea, coffee, and alcohol, and all rich dishes and fermented drinks. The food must chiefly consist of milk and eggs, green vegetables, and well-cooked fresh meats. Water should be taken with meals.

It has been discovered by experience that no drug is so valuable in warding off attacks of angina as iodide of potash, and this should be taken in large doses.

PRESCRIPTION 67

Iodide of potash	.	.	.	.	80	grains.
Tincture of orange	.	.	.	.	$2\frac{1}{2}$	drachms.
Spirits of chloroform	.	.	.	.	2	drachms.
Infusion of gentian	to 8 ounces.					

A dessertspoonful to be taken 3 times a day and the dose gradually increased until 2 tablespoonfuls are taken 3 times a day.

It is recommended that the mixture be taken for three weeks of every month, and during the remaining days of the month a tablet of $\frac{1}{100}$ grain of nitro-glycerine three times a day. Or the nitro-glycerine may be replaced by a tablet of erythrol nitrate, $\frac{1}{2}$ grain three times a day.

CHAPTER XI

DISORDERS OF THE BLOOD-VESSELS

Atheroma—Embolism—Thrombosis—Aneurysm—Phlebitis—White Leg—Flushing of Dyspepsia—Flushing of "Change of Life"—Raynaud's Disease.

ATHEROMA

THE *arteries* are liable to certain diseases which do not give rise to very evident symptoms, but gradually produce serious trouble in the parts to which they carry the supply of blood. One of the most common of these affections is called atheroma, and is found to a larger or smaller extent in all old people; indeed, it can be looked upon as a sign of old age whenever it appears, for in younger people it shows that their arteries are growing old prematurely.

The chief causes of atheroma and other allied conditions are (1) overstrain of the blood-vessels by excessive physical labour, (2) excessive indulgence in alcohol, and (3) the gouty constitution.

Causes. Any of these conditions, acting for a long period upon the vessels, sets up a chronic inflammation and thickening of the walls.

The ultimate results depend upon the course taken by the disease. If the wall of the vessel simply becomes thickened and swollen, the amount of blood flowing through it is reduced, and the artery is partially blocked. As a consequence the organ depending upon the affected vessel for its blood supply is starved, and becomes diseased. Softening of the brain is sometimes caused in this way.

Course and Results. In many cases the thickened artery undergoes fatty degeneration, and softens; the wall, thus weakened, is stretched by the pressure of the blood, and the vessel enlarges to such an extent that a tumour forms, to which the name of aneurysm is given.

Or the softened wall may, as the result of a sudden strain, give way altogether, and the blood be poured out into the surrounding structures. The vessels of the brain, on account of the thinness of their walls, are

specially liable to this serious accident, and this produces the condition called apoplexy, or a "stroke" of paralysis.

Again, the thickening of the arterial coat may be so extreme as completely to block the vessel and cut off all nourishment to the parts beyond; these will then die. Mortification produced in this way is most commonly seen in the disease called senile gangrene, which sometimes affects the toes of aged people.

Yet another change which occurs in atheroma is the deposit of lime salts in the thickened artery, which becomes calcified and loses its elasticity; the inner wall of the vessel is often worn off over bony plates formed in this way, and the blood, passing over the roughened surface, gradually clots. These little clots become detached, and are swept away in the current of blood until they become arrested in some organ and plug up a vessel, and thus produce the conditions called thrombosis and embolism. It is quite possible to recognise the existence of calcification in the superficial arteries of some people by the hard feel the vessels have under the finger.

Atheroma is considered by many an incurable disease, but occasionally cases obtain much relief from a long-continued course of iodide of potash (Pr. 67, p. 211), which should be carried out under medical supervision.

EMBOLISM

Is the name given to the blocking of an artery by a portion of blood-clot carried to it from another part of the body. It sometimes occurs, as we have already explained, as the result of atheroma, but it is much more frequently met with in disease of the valves of the heart. As the consequence of inflammation (endocarditis) the heart-valves become roughened, and blood-clots form on them; these become detached by the stream of blood, and are carried onwards along the arteries until they reach a vessel too small to allow them to pass. Here they are arrested, and cause an obstruction to the flow of blood to the parts beyond. One of the most common situations for this trouble to occur is in the arteries of the brain; the consequent symptoms are very similar to those of apoplexy, and the condition is a very serious one.

THROMBOSIS

Or clotting of the blood in the blood-vessels during life, may occur in either the arteries or the veins. In a healthy vessel the blood remains fluid, but if inflammation is set up, or the smooth internal membrane becomes roughened or diseased, clots are likely to form.

ANEURYSM

As we have seen, this term is applied to the tumour of an artery formed by the gradual stretching of its coat by the pressure of the blood. It occurs only when the walls of the artery have been weakened by disease, as in atheroma (p. 212), or by injury, such as a severe strain or wound of the vessel. It affects persons of advanced years, being seldom seen under the age of thirty or forty, and is more common in men than women, probably on account of their more active life and their greater liability to over-exertion. Soldiers, sailors, and navvies are its special victims, from the necessity their lives entail of periods of hard work and violent exercise. No arteries are immune, but it is much more commonly found in the big artery of the chest called the aorta, and our remarks will therefore particularly apply to the disease in this situation.

When an aneurysm of the aorta commences, its symptoms are very obscure, and it is only a skilled physician who can recognise its presence.

Symptoms. Whilst small it is entirely contained in the chest, but later may come to the surface in various positions, either in front through the ribs, at the back to one side of the spine, or upwards in the neck. As it enlarges it presses upon the parts in its neighbourhood, and gradually develops symptoms. Pressure on the nerves gives rise to pain, on the lungs and windpipe to difficulty of breathing and a peculiar noisy cough. By degrees the pressure destroys the parts; the bones become worn away and the muscles wasted. The pulse is often altered, that on the side chiefly affected being small, weak, and felt later than that on the other side. When the tumour reaches the surface it can be felt to pulsate with each beat of the heart, and a rushing sound can be heard in it, caused by the current of blood through it.

An aneurysm occasionally undergoes a spontaneous cure by the formation of a blood-clot in it, which fills its cavity, but its natural tendency is to grow larger and its walls thinner, and death finally takes place from pressure on some vital organ, or from the bursting of the tumour and a copious loss of blood.

The aim of treatment is to follow Nature's guide and cause the formation of blood-clot. To obtain this by medical means it is necessary to reduce the force of the blood current. The patient is
Treatment. kept absolutely still in bed, on a very reduced diet, and is put on a course of iodide of potash. Surgical measures are sometimes resorted to, and clotting is produced by introducing substances,

solid or fluid, into the cavity of the tumour, or by the use of an electric current. But the disease is very dangerous, and there is not much hope of ultimate recovery.

PHLEBITIS

The *veins* are not liable to many affections. The two most common troubles are inflammation and varicosity. The latter is described amongst surgical diseases.

Inflammation of veins, or phlebitis, is set up when for any reason the blood contained in the veins becomes clotted. This sometimes

Causes. occurs in the last stages of severe exhausting illness, such as consumption or the severe fevers, of which enteric fever is the one most commonly complicated in this way. Phlebitis may also be caused by the spread of inflammation from the surrounding parts, as in wounds or old ulcers. One variety is met with in gouty persons, and is called gouty phlebitis, but how it is produced is not understood.

The inflamed veins are felt as hard, swollen, and tender cords running along the limb. There is a sensation of stiffness in the part,

Symptoms. with sharp, shooting pains. If the affected veins are on the surface, they appear as bluish-red lines. From the interference with the circulation, the parts from which the blood should be drained become swollen.

The great danger of this complaint is the liability for portions of the clot to become detached, and to float off into the circulation and pass to vital parts of the body. The aim of treatment is

Treatment. to prevent this, and the affected limb must therefore be kept completely at rest by being laid on a pillow, or even fixed to a splint. The patient is confined absolutely to bed, and kept upon light diet. Warm fomentations, and the application of equal parts of extract of belladonna and glycerine, relieve the pain and subdue the inflammation. When all signs of trouble have disappeared the patient may be allowed to get up, and the remaining swelling must be subdued by the application of a Martin's elastic or crêpe bandage, while the general health is restored by good feeding and the bark and ammonia tonic (*see* chapter on Drugs and Prescriptions).

Phlegmasia dolens, or white leg, is one of the commonest forms of phlebitis, in which the inflammation has spread from the womb to the large vein of the leg. Its symptoms and treatment are similar to those already described.

FLUSHING

Is due to the rapid enlargement of the small vessels of the skin, and is produced by the action of the nervous system on the blood-vessels.

We have seen that the heart and blood-vessels are under the control of the nerves, and that many very different conditions may act through them and produce this trouble. It may occur as one of the symptoms of heart disease, especially of the functional order, but it cannot be looked upon as at all serious, and will gradually disappear as the other symptoms are relieved by suitable treatment.

Flushing is a common accompaniment of all forms of dyspepsia, especially in women. Shortly after a meal the face grows hot and red, and the redness is particularly likely to affect the nose. **Flushing of Dyspepsia.** If this is allowed to continue unrelieved it may be followed by a disfiguring eruption on the nose and cheeks, in which raised red spots form, and the little blood-vessels remain permanently enlarged, forming fine red lines. This indication of a disordered digestion, although it may occur alone, is usually combined with other dyspeptic symptoms, such as fulness and discomfort after meals, with flatulence and acidity, and it can be cured by the ordinary measures advised elsewhere for the cure of dyspepsia. The diet must be carefully arranged and simple in character, all strongly flavoured and rich dishes, condiments, and spices being omitted. Alcohol is a common cause of redness of the face, and should therefore be avoided. The bowels should never be allowed to remain constipated.

Another cause of flushing, which is due even more distinctly to the sensitive condition of the nervous system, is that which occurs at the "change of life." **Flushing of "Change of Life."** It affects women between forty-five and fifty years of age. The flushes are often accompanied with a feeling of heat. The sensations start from some spot, such as the pit of the stomach, and spread over the body, rising into the face, which becomes a scarlet colour. The patient breaks into a free chilly perspiration, and runs great risk of catching cold from the wetting of her clothing. The attacks come on without warning and without apparent cause, and may occur frequently throughout the day. This condition may be looked upon as normal from the point of view that most women have to pass through the experience, but not as normal in the sense that it must be borne with patience and without seeking relief from treatment. Much benefit can be obtained from suitable remedies, which must be directed to tranquillising the sensitive condition of the nervous system.

Other symptoms accompany the heats and flushes, and it is of the utmost importance that any signs of internal trouble occurring at this critical period of life should receive immediate attention, and not be treated as of no consequence just because they occur at the time of "the change."

The action of the various organs of the body should be regulated. The bowels should be kept active with occasional doses of salts, a tea-spoonful of sulphate of magnesia, a dose of Carlsbad salts, or two or three ounces of Apenta water. If the skin is stimulated by hot baths at a temperature of 100° to 104° for twenty minutes two or three times a week at bed-time, the nervous symptoms are much relieved; and we can strongly advise this form of treatment. The diet also is of importance. All meats should be taken in much smaller quantities than usual. Boiled meat is better than roast or baked, and fish should take its place in at least one meal a day. Vegetables and fruits may be eaten freely, but spices and condiments are bad. Alcohol should not be taken at all in any form, and tea and coffee should be drunk very weak. Water is the best drink, and at least two to three pints should be taken daily. A quiet, healthy life should be led, with early hours; the rooms should be well ventilated, moderate exercise should be taken, and all excitement and mental strain avoided. The best drug is bromide of potash, which soothes the nerves, relieves headache, depression, and the various nervous symptoms. The following mixture can be recommended:—

PRESCRIPTION 68

Bromide of potash	80 grains.
Tincture of rhubarb	1 ounce.
Bicarbonate of soda	2 drachms.
Spirits of chloroform	2½ drachms.
Infusion of gentian to 8 ounces	

An eighth part to be taken 3 times a day before meals.

This may be taken for a week or ten days at a time, and then discontinued for a few days. Tablets of bromide of potash may be employed if preferred—two of the 5-grain tablets three times a day.

RAYNAUD'S DISEASE ("DEAD FINGERS," ETC.)

The action of the nervous system upon the blood-vessels is shown in another disease, which was described in 1862 by Raynaud, a French physician. In this affection the condition is exactly the reverse of that

found in flushing, for the small arteries are tightly constricted, and the supply of blood is cut off from the part.

There are various grades shown in the complaint. The mildest is familiar in what is called "dead fingers," produced by cold. Some of

Symptoms. the fingers or toes become white, cold, and numb, and feel icy cold and dead. This seldom lasts for more than an hour or so, and then passes off gradually, the parts growing burning hot and red as the circulation is restored, often with a sensation of throbbing pain and tingling.

A more advanced stage, which may be preceded by that which we have described, occurs in chilblains. The affected fingers or toes become cold, swollen, and dusky-blue in colour, and there are sensations of tingling, pain, and numbness. Recovery, which may follow in a few seconds or not for many hours or even days, is accompanied with redness and intense burning pain.

In certain cases the constriction of the small blood-vessels is so extreme and long-continued that the starved structures die, and the skin, or even the whole thickness of the part, grows black and dry, and finally drops off. This stage is called symmetrical gangrene, because the disease is very liable to destroy corresponding parts on both limbs or on both sides of the body. Another curious symptom which occasionally accompanies this disease is the passage of blood-stained urine, which, upon examination under a microscope, shows no red blood-cells, but only the colouring matter of the blood with what look like broken-up cells. This condition of the urine is accompanied with pain in the pit of the stomach, yawning, drowsiness, and a feeling of sickness.

These varied conditions may occur in persons of all ages, and the later stages are not uncommon in children. The exciting cause is exposure to cold, and therefore the symptoms usually
Causes. occur in winter; but nervous inheritance is a predisposing cause, and it is most often nervous people who are affected.

Care must be taken to guard against cold; warm underclothing and stockings should be worn, and healthy exercise encouraged. Galvanism
Treatment. and massage to improve the general tone of the affected part can be recommended, and tonics, especially quinine.

Tablets of nitro-glycerine $\frac{1}{100}$ grain, or of ichthyol $2\frac{1}{2}$ grains three times a day, have been found useful.

CHAPTER XII

THE BREATHING ORGANS

The Chest and its walls—Inspiration and Expiration—Different Kinds of Breathing—Respiration both a Voluntary and an Involuntary Act—Lungs—Pleura—The Respiratory Murmur—Nose—Pharynx—Larynx—Windpipe—Bronchial Tubes—Inner and Outer Respiration.

RESPIRATION or breathing is one of the primary essentials of the maintenance of life, and if it fail to be carried out naturally and continuously the health suffers and disease is set up.

The act of respiration is divided into two parts. The first, called inspiration, consists in the filling of the chest with air drawn in from the atmosphere; and the second, expiration, the driving out from the chest of the air it contains. The whole process is well represented by the action of bellows, for the action of the chest walls and of the muscles that move them is very similar in its nature to that of a pair of bellows.

The essential organs of breathing are the lungs, which, with the heart, occupy the greater part of the cavity of the chest. The air is carried to and

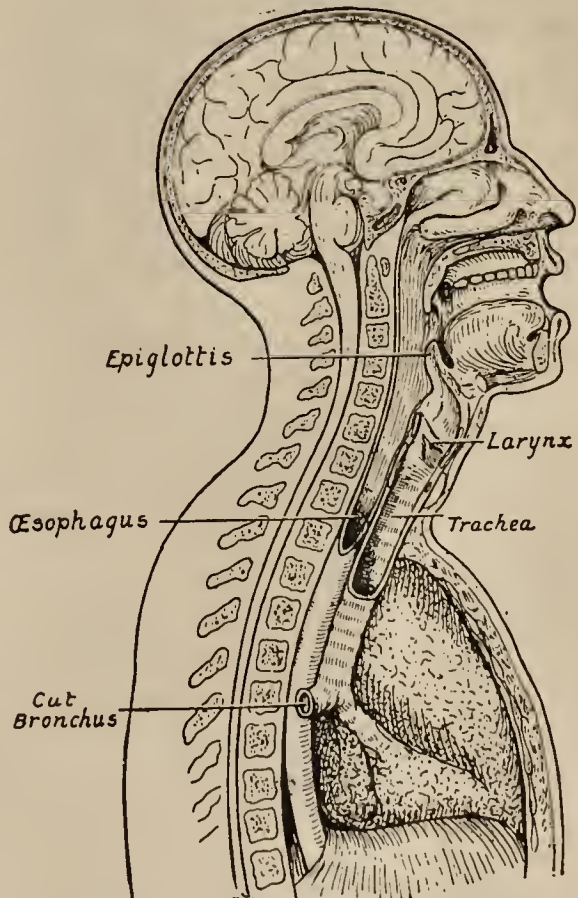


Fig. 24.—THE RESPIRATORY TRACT.

from them along the air passages, which consist of the nose, the pharynx, the larynx, the windpipe, and the bronchial tubes.

The chest is conical in shape, its upper part being small and rounded, whilst its lower part is much larger, and slopes downwards

The Chest. and backwards. The chest walls are formed partly of bone and partly of muscle; its bony framework consists of the backbone or spinal column at the back, the breast bone in front, and the twelve pairs of long, curved, thin bones or ribs at the sides. The spaces between the ribs are occupied by the intercostal muscles, and its lower end is shut in by the diaphragm or midriff, a large dome-shaped muscle which separates the cavity of the chest from that of the abdomen. Many other muscles are fixed to and act upon the ribs.

The walls of the chest are so arranged that the capacity of its cavity can be altered, and thus enable it to carry out the bellows action by which the air is moved into and out of the lungs. **Inspiration and Expiration.** Inspiration, or the filling of the chest with air, is brought about by the action of certain muscles which, by raising the ribs, increase the size of the chest cavity; at the same time the muscular diaphragm is flattened out and enlarges the size of the chest downwards by pushing down the organs beneath it and making the abdomen protrude. The chest being air-tight, the increased space thus formed can only be filled by air rushing in through the air passages and distending the lungs. In expiration the chest cavity is made smaller by the natural elasticity of all the parts; the ribs fall, the diaphragm relaxes, the distended lungs contract, and the air is driven out until the pressures inside and outside are equalised.

The movements during respiration present some peculiarities in different classes of persons. In young children the air is drawn into the chest chiefly by movements of the diaphragm, and its action can be recognised by the marked protrusion of the walls of the abdomen at each breath. **Different Kinds of Breathing.** This type is therefore called abdominal breathing. In men the diaphragm is much used, but is assisted by active movements of the lower ribs; this kind of breathing takes a position between that of children and of women. In women the diaphragm is aided by extensive movements of the upper ribs, the walls of the chest being much more engaged, and the breathing is described as thoracic.

The movements of breathing are carried out by voluntary muscles—that is, muscles over which the will can exercise control, for we can at

pleasure increase the rapidity or depth of our breathing, and even check it altogether for a time; but Nature performs the office involuntarily also. The duty is under the supervision of a special part of the nervous system, situated in the lowest part of the brain, called the medulla, and this is stirred to action by the needs of the body and by information transmitted through the nerves, and so the movements essential to the preservation of life are carried on in constant and regular succession night and day, through sleep and unconsciousness, as long as health and life continue.

The process of expiration and inspiration takes place in a healthy adult person about seventeen times a minute, but the number varies slightly in different individuals. It is also increased very considerably by exercise, fever, and nervous influences. At birth respiration is performed much more rapidly, even thirty times a minute; in

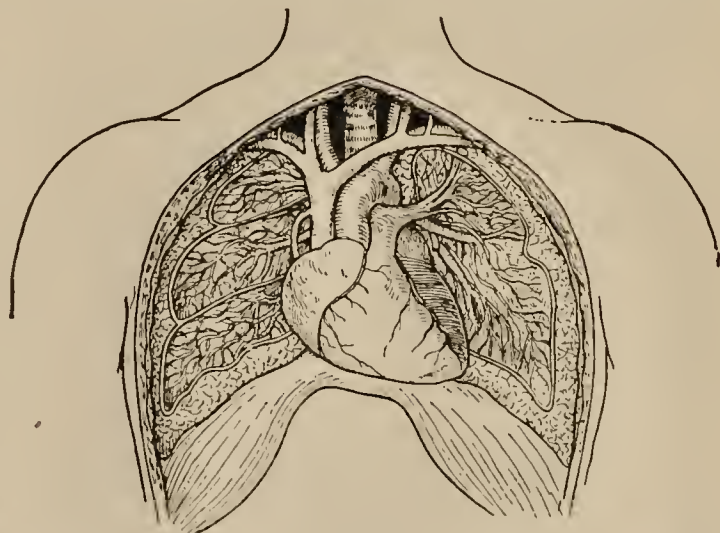


Fig. 25.—THE LUNGS, WITH THE HEART AND THE DIAPHRAGM.

childhood it grows gradually slower until adult life, and as old age approaches it somewhat increases again. The relation between the number of respirations to heart-beats is fairly uniform, and is as one to four or five; but this is much altered by certain diseases, the significance of which changes we shall learn later.

The lungs occupy the greater portion of the cavity of the chest or thorax, having in between them the heart and large blood-vessels.

The Lungs. They extend from the diaphragm to the neck, and rise at least 1 inch above the highest rib. They are large spongy organs of a greyish colour with darker spots and patches scattered over their surface; together they weigh from 2 to 2½ pounds. When healthy they are light enough to float in water, but when diseased or devoid of air they will sink. The whole of the spongy substance is made up of an enormous number of minute,

excessively thin-walled cavities, called the air-cells. These are about $\frac{1}{100}$ inch in diameter, and it has been estimated that they number more than seven hundred millions. They have on one surface of their walls a network of innumerable minute blood-vessels, called capillaries, whilst on the other surface they are in contact with the air in their cavities. In this way the air and the blood are brought into very close contact with one another. The air-cells are bound together in bunches like microscopic grapes, and these are again connected with others to make up the substance of the whole lung.



Fig. 26.—
AIR-CELLS.

The entire surface of the lungs is covered with a thin membrane called the pleura, a layer of which also lines the inner surface of the chest walls. It is smooth, shiny, and moistened with a small quantity of clear fluid, which prevents friction of the surfaces in the movements of respiration. Between these two layers is a cavity or space—the pleural cavity. Owing to the air pressure within the lung, the two surfaces of the pleura are kept closely pressed together, and only become separated by disease.

If the ear be placed against the chest, or a stethoscope be employed, a faint murmur is heard during inspiration. It is due to the rapid stretching of the air-cells and to friction of the air in the air passages. It is called the respiratory murmur, and must not be confused with the much louder sound caused by the air rushing through the windpipe and large bronchial tubes. It is of great importance to the physician in the recognition of disorders of the breathing organs, and is altered in many ways by disease.

The Respiratory Murmur.

The nose is the special organ of the sense of smell, but it is also a very important part of the organs of respiration. Whatever may be the shape of this organ—Grecian, Roman, or *retroussé*, ornamental or otherwise—it is undoubtedly intended to be used in the process of breathing. The air enters the nose by the nostrils (anterior nares), and passes into irregular spaces or cavities, and there meets with a watchful sentinel in the form of the sense of smell, which gives notice of the entrance of offensive air and of irritating particles. Having entered the cavities of the nose, the inhaled air passes over the lining or mucous membrane. This is spread over the whole internal surface, and its extent is much increased

The Air Passages.

by a number of small thin bones which project from the sides. The mucous membrane is moist and warm, and full of blood kept at the natural temperature of the body.

By transmission through the nose the air is prepared for its entry into the sensitive air passages beyond, being warmed, moistened, and to some extent filtered of solid particles and disease germs.

The inspired air passes from the back of the nose through the pharynx, which is a passage used in common by both the breathing and digestive organs. Through its roof is the opening

The Pharynx. from the nose, placed just behind the palate; its front communicates directly with the mouth; in its side walls are the orifices of the Eustachian tubes, which lead to the ears; and in its floor are the two openings of the upper ends of the windpipe and gullet, the latter situated behind the former.

The larynx, or voice-box, forms the upper part of the windpipe, and lies just in front of the gullet, so that all food has to

The Larynx. pass over it in the act of swallowing, and it is supplied with a protecting cover attached to its front, which mechanically closes

so as to allow each morsel of food to slip over it into the gullet. Were it not for this epiglottis

(Fig. 24), particles of food would be constantly going the wrong way and causing attacks of choking and coughing. The air, however,

passes freely into the voice-box, and there traverses the narrowest part of the air passages. The larynx is a small box made of gristle, of

peculiar shape, and is situated in the upper part of the neck, its front forming a distinct projection, which is called "Adam's apple," because it

is much more evident in men than in women; its correct name is the thyroid cartilage. Running backwards from its

inner surface are two folds of mucous membrane, called the vocal cords, which are fixed to the back of the larynx, and have between them a

narrow chink called the glottis. It is the vocal cords that produce the voice; they are acted on by small muscles which slacken or tighten them as desired and in this way alter the width of the slit between

them and allow their thin edges to vibrate freely in the current of air

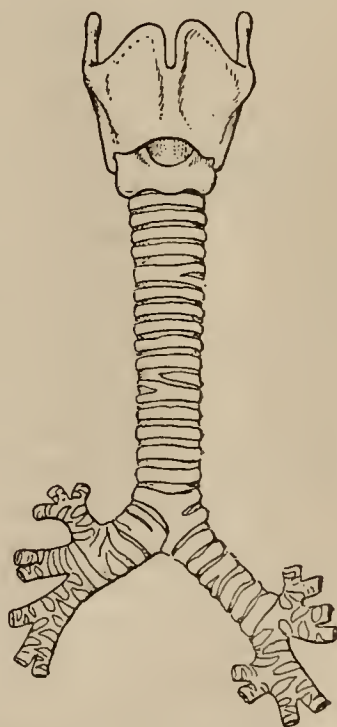


Fig. 27.—LARYNX, WIND-PIPE, AND BRONCHIAL TUBES.

as it passes out from the chest. When sounding a high note they are tight, close together, and vibrate rapidly, whilst when a low note is being produced they are loose, wider apart, and vibrate much more slowly. They occupy an intermediate position, and remain unaffected by the current of air during natural, quiet breathing.



Fig. 28.—THE VOCAL CORDS, WIDE APART AND NEARLY CLOSED.

The mucous membrane of the larynx is most sensitive to solid particles or cold air, and if slight inflammation causes swelling of the vocal cords the voice becomes muffled and hoarse, and the space between them is so narrow—only $\frac{1}{3}$ inch at its

widest part—that a very little swelling may cause dangerous obstruction to breathing.

Continuous with the larynx below is the windpipe, or trachea, a tube from 4 to 4½ inches in length, the walls of which are prevented from collapsing by elastic springs of gristle. It is placed in the centre of the front of the throat, and extends from the larynx downwards into the chest behind the breast-bone. Here it divides into the two main bronchial tubes, one of which passes to each lung and grows rapidly smaller by constant division, until it ends by swelling out into a bunch of minute thin-walled sacs, which are the air-cells of the lungs.

The Windpipe.

The Bronchial Tubes.

The larger bronchial tubes are kept from collapsing by pieces of gristle, and contain in their walls muscular fibres which, by contracting, can alter the size of the passages and thus vary the amount of air which enters the chest. The mucous membrane which lines them is supplied with an enormous number of diminutive processes called cilia, which maintain a continual waving movement always in the same direction, and drive along any phlegm or dust particles towards the mouth.

There are two sets of respiratory processes taking place in our bodies, to which the terms outer and inner respiration have been applied. It will be well briefly to consider the nutritive processes that occur in order fully to understand the value and importance of respiration to the animal economy. Food, as we have seen, is taken into the body, is altered by digestion, and finally enters the blood. By the blood it is carried to the tissues (the muscles, nerves, and glands), nourishes them, and

forms new material. When any kind of work is done by some organ of the body, either muscles, nerves, or glands, it takes the form of combustion: that is, some part of the body combines with oxygen and gives out energy, and as a result produces waste materials, one of the chief of which is carbonic acid. These pass out of the tissues into the blood, and are carried by it to the blood-vessels of the lungs. Here the blood meets with freshly inspired air, gives up its carbonic acid and water, and takes instead fresh oxygen, and with this returns to the tissues. Respiration, therefore, consists in supplying oxygen to and removing carbonic acid and water from the blood. This process, which takes place in the lungs, is that which we referred to as external respiration, whilst internal respiration is the process by which oxygen is taken out of the blood by the tissues and their useless carbonic acid is discharged into it.

Oxygen, we may add, is essential to the maintenance of life. It forms one-fifth of the atmosphere, the other four-fifths being nitrogen, the value of which is simply to dilute the oxygen and mollify its action.

CHAPTER XIII

DISORDERS OF THE NOSE AND THROAT

Coryza, or Acute Nasal Catarrh—Ozæna—Nasal Douches—Hay Fever—Simple Sore Throat—Clergyman's Sore Throat—Relaxed Throat—Follicular Tonsillitis—Acute Tonsillitis, or Quinsy—Poison Sore Throats—Ulcerated Sore Throats—Infectious Sore Throats—Nervous Voice Affections—Laryngitis—Cough.

DISORDERS OF THE NOSE

THE nose, besides being part of the respiratory tract, is also the seat of the sense of smell, and a few words on the alterations of this function as the result of injury or disease may be useful. The olfactory nerve, or nerve of smell, is derived from the front part of the brain, and passes through a number of small holes in the bone of the skull into the nose, where it is spread over the mucous membrane of the upper and back part of the nasal cavities, its small terminal filaments being supplied with a special apparatus to which it owes its peculiar powers. In ordinary quiet breathing through the nose, the air hardly enters into the parts of the cavity gifted with the power of smell, but passes along the lower passages. If, however, the air is drawn in by the action of sniffing, in which the nostrils are compressed, it is driven up into the sensitive region of the nose. The air can also reach this region through the throat from the mouth, and all substances which have volatile or gaseous flavours or scents are recognised in this way by the sense of smell, as much as, if not more than, by the sense of taste; this is especially true of wine-tasting, etc. If for any reason the air cannot reach the sensitive parts of the nose, the sense of smell is impaired. In some forms of paralysis or deformity of the nose the power of sniffing is lost; in cases of polypus the passages are blocked; in a bad cold in the head the mucous membrane is so swollen that the nose is obstructed. All of these are examples of loss of smell from mechanical reasons. Sometimes the mucous membrane becomes dry

and insensitive, or its power of perception may be blunted by overstimulation, as with the habit of snuff-taking. A blow on the nose has been known to be followed by loss of smell, probably because the injury has cracked the bone forming the roof of the nose, through which the nerve fibres pass, and has torn these fibres. The same condition may result from disease, especially disease of nervous origin, as hysteria or brain affection. But perhaps the most common form of loss of smell is that which follows an attack of influenza. This may be complete for a time, but the sense of smell gradually returns as the general health is restored. The most useful drug in such cases is strychnia, and the proper preparation to use is the solution, 3 drops being the dose, to be taken three or four times a day with water.

The external diseases of the nose are described elsewhere. Acne rosacea, popularly called "grog blossoms" or "gin-drinker's nose," is dealt with among Skin Diseases, where also we shall find a description of lupus, which often attacks this organ. Of internal nasal diseases the most frequent is

CORYZA, OR ACUTE NASAL CATARRH

The symptoms of "a cold in the head" are only too familiar to all of us, but, although excessively unpleasant, the affection is seldom at all serious. It consists of an inflammation of the mucous membrane lining the cavities of the nose, and as this is directly continuous with the mucous membrane lining other parts, the symptoms may vary according to the direction in which it spreads.

Exposure to cold and damp is the common cause, but the form of exposure may vary almost indefinitely. One person always catches cold when he sits in a draught, another from sudden change of temperature, another when his feet get wet, and there is no doubt that the greatest danger is not when the whole body is exposed, but when some portion of it becomes chilled. A fruitful source of catarrh is sitting in a current of air when in a state of perspiration. Run for a train and then sit with both of the carriage windows open; play a good game of lawn tennis, and then sit down and have a cup of tea on the lawn; have a round of golf, and drive home without extra covering in a motor-car, and probably you will be rewarded with a cold. There is little doubt that rapid progress through the air is a fruitful means of catching cold, even on a warm day, if good wraps are not worn.

A feeling of chilliness, shivering, or even a rigor ushers in many an attack of catarrh, and if the clinical thermometer is used a slight rise of temperature is discovered. Sneezing sets in, the **Symptoms.** nose feels stopped up and uncomfortable. The mucous membrane is swollen, full of blood, and very sensitive. It now begins to secrete a watery fluid, which requires constant blowing of the nose, so that the organ becomes red and sore, a condition which is aggravated by the irritating nature of the watery discharge. The catarrh may spread into the pharynx and produce sore throat with difficulty of swallowing; or it may pass along the Eustachian tubes and cause deafness and ear-ache; or upwards into the cavities in the frontal bone, and give rise to heaviness and headache; or along the ducts to the eyes, and make them red, bloodshot, and watery; or into the larynx, with consequent hoarseness and cough; or into the mouth, making the tongue sore and the gums tender, setting up toothache and neuralgia; or finally downwards along the bronchial tubes to the lung, and end in a bad attack of bronchitis, or even pneumonia.

What is the explanation of this curious sequence of phenomena? How does exposure to cold in the circumstances we have mentioned produce a catarrh, with all its uncomfortable accompaniments? We are here only theorising, and our explanations are but guess-work; but it appears as if the effect of cold must be to lower the vitality and resistance of the parts, and render them more liable to attack by driving the blood into other organs. The attack may well be imagined to be that of germs which, with the body in a state of healthy vitality, have no power to do injury, but in a state of malnutrition and loss of resistance attack with success, and produce inflammation.

This theory of the germ origin of common colds is supported by the undoubted fact that many of them are infectious. If one member of a household, be it only the family cat, gets a cold, it is very likely to run through the whole household in turn before it stops. This infectious character of colds is one of the great troubles in schools, where the complaint, introduced by one of the children, may affect child after child. Unfortunately, also, the first attack affords no protection for the future, so that over and over again the infection may be restarted in a school all through the winter months.

There are certain persons who are particularly prone to catarrhs; they catch cold upon the slightest excuse and after the most trivial exposure; indeed, this proclivity seems almost to be hereditary. On the other hand, many lucky individuals hardly ever suffer in this way,

They sit in draughts and get their clothes wet with impunity; their powers of resistance to such attacks are marvellous, and they seem to be armour-clad against the attacking germs. Why this is we cannot say.

There are various means which are believed to stop a cold in its initial stage, and some of them are efficacious in some cases, if not in all. Some people always resort to camphor to check a

Treatment. cold; 10 drops of the spirits of camphor in water or on a lump of sugar every half-hour for three doses may be tried. A tea-spoonful of the ammoniated tincture of quinine in water is also useful, although it is a remarkably unpleasant dose. Various astringent and sedative substances applied directly to the mucous membrane are likely to do good, such as the ordinary ammonia smelling-salts, Ferrier's snuff, and menthol snuff. Inhalations of eucalyptus oil are very soothing; it is well to use this when going to bed. A few drops of the oil are placed in a jugful of hot water, and the steam breathed in and out of the nose for a few minutes. Bathing the nose and forehead with very hot water is soothing, and relieves the feeling of congestion, and lessens the discharge.

The following are simple mixtures for a cold in the head. The first is for a child of seven, but the dose may be diminished or increased according to age; the second is for an adult.

PREScription 69

Tincture of aconite	6 drops.
Sweet spirits of nitre	40 drops.
Syrup of orange	3 drachms.
Water to 1 ounce.	

A dessertspoonful to be taken every hour for the 4 doses. (For a child of 7 years.)

PREScription 70

Solution of acetate of ammonia . .	2 ounces.
Salicylate of soda	60 grains.
Bromide of potash	80 grains.
Liquid extract of liquorice . . .	1 ounce.
Water to 8 ounces.	

An eighth part to be taken every 3 hours. (For an adult.)

If these steps are not successful in checking the cold in its first stage, when there is only a dry, sensitive, uncomfortable feeling in the nose, it is necessary to proceed to more active measures. Nothing now will relieve the symptoms so thoroughly as a good perspiration, especially if the patient is at all feverish. He should go to bed and

have something hot to drink—a cupful of hot gruel or a glass of hot spirit and water with plenty of sugar. A hot bath, or putting the feet into hot water and mustard, has the same effect; it encourages perspiration, and tends to draw away the blood from the head to other parts. Seven to 10 grains of Dover's powder taken at bedtime cause a free sweat in the night, and the patient may get up without his catarrh, but unfortunately he is very likely to have a headache instead, caused by the opium the powder contains. Anyhow, this is not so difficult to bear, and is usually removed by taking a good purge first thing the next morning. It is well not to be in a hurry to be up and about; take an extra hour or so in bed, and have a large cupful of bread-and-milk before rising. To prevent catching another cold after a free perspiration, it is a good precaution to sponge the body all over with tepid water before dressing.

The diet during the early and acute stages of a cold should be somewhat limited, and consist of light solid and milk foods.

Diet. This is particularly necessary if there is fever. The popular saying on this matter should be, "If you feed a cold you will have to starve a fever." In the later stages, however, the patient feels low and weakened, and it is then necessary to improve his condition and increase his strength by good feeding and, perhaps, a glass of wine or some spirit. Dr. Williams recommends a different course: he advises abstinence from all fluids as far as possible, in order to check the watery discharge by cutting off the supply. However, warm simple drinks are usually very grateful to those suffering from a catarrh, and they find comfort in gruel, black-currant tea, and barley-water. In the late stages, when the fever has gone and the discharge is thick, tonics must be taken, such as bark and ammonia (Pr. 76).

CHRONIC NASAL CATARRH

Sometimes follows repeated attacks of the acute form, but is much more often caused by the presence of adenoid growths. One form of it is called *ozæna*, the most prominent symptom of which is an offensive discharge of matter, mixed occasionally with crusts and scabs of dried material. This has given it the popular but somewhat disgusting name of "stink-nose," but this is not more disgusting than the complaint itself. It has many causes, all of which produce an inflammation of the lining membrane, which becomes thickened, and frequently ulcerated, and from this comes the dirty, offensive discharge. It continues for a long time,

**Symptoms
of Ozæna.**

and if not properly treated may spread deeply, and finally involve the bones of the nose. A similar condition may be produced by the presence of a foreign body in the nose, an accident most likely to be met with in children who amuse themselves by pushing buttons, peas, and such things up the nostrils. If these pass out of reach the child may forget their existence, and they are only discovered by an offensive discharge being set up.

To cure ozæna we must apply antiseptic and healing applications to the cavities of the nose, and constitutional treatment to remedy the cause. For the latter, quinine, iodide of iron, arsenic, and cod-liver oil are useful. Locally we may use (1) powders as snuff, such as equal parts of subnitrate of bismuth and gum, or Ferrier's snuff; or (2) vapours by inhalation, as eucalyptus oil; or (3) sprays; or (4) lotions with the nasal douche. Of lotions we may mention a few, as this is certainly the most efficacious means



Fig. 29.—NASAL DOUCHE.

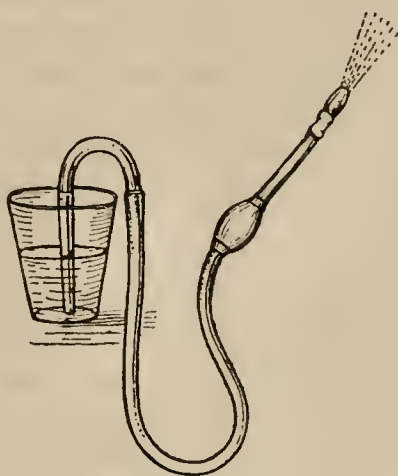


Fig. 30.—SYPHON NASAL DOUCHE.

of carrying out local treatment, and the nasal douche is easy to use. A weak solution of Condyl's fluid and water of a light purple colour; carbolic acid, 1 part in 80 of warm water; boracic acid or alum, a teaspoonful to 1 pint of warm water; glycerine and warm water, $\frac{1}{2}$ ounce of each, with tincture of iodine, 10 drops, well mixed, are all suitable. As much injury and deformity may result from neglected cases, a doctor's advice should be obtained when possible.

There are various forms of the nasal douche; the simplest are the best. One of the simplest is a peculiarly shaped little bottle (Fig. 29), with a nozzle at one end and an opening at the other, through which

the lotion can be introduced; the nozzle is placed in one nostril and the lotion poured into the nose, whilst the finger placed over the opening can control the flow. Another form consists of a tube in the middle of which is a small ball (Fig. 30). If the nozzle is placed in the nostril the flow of the lotion can be started by squeezing the ball, and will continue to run by gravity.

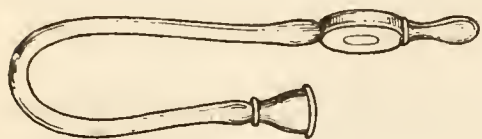


Fig. 31.—INSUFFLATOR.

To use the douche the patient should bend the head slightly forward and open his mouth, breathing entirely through it. The nozzle of the douche is then introduced into the nostril, and the fluid allowed to run freely. By breathing through the mouth the back of the nostrils is closed by the curtain of the soft palate, which is raised up into the opening, and the lotion will all run out of the other nostril, and none pass downwards into the throat. In this way the whole of the nasal cavities can be washed out thoroughly.

The application of powders to the deeper parts of the nasal cavities can best be carried out by an instrument called an insufflator (Fig. 31), which consists of a tube to be introduced into the nostril, along which the powder is driven by a current of air caused by pressing a rubber ball.

HAY FEVER

Or hay asthma is a peculiar form of catarrh to which certain persons are strongly predisposed. The cause of this predisposition is at present quite unknown, but apparently it is due to an extremely sensitive condition of the nervous system. Curiously, it is a disease which is almost entirely confined to the educated classes, and has included amongst its victims some who were high in rank and social position, or who were distinguished for their mental and literary attainments. William IV. of England; Southey, the poet; Daniel Webster, the statesman; and Henry Ward Beecher, the preacher, are all said to have suffered persistently from hay fever. The first attack often comes on in childhood, and rarely late in life, and men are much more frequently affected than women. Apparently in many cases there is a distinct hereditary tendency, for the disease often runs in families. It is met with in most European countries, but is undoubtedly more common in England than anywhere else in the world.

It is produced by the irritation of the mucous membrane by the grains of pollen of many grasses and of some plants. This explains

why the disease is only met with at certain times of the year, namely, for about six or eight weeks from the middle of May to the middle of

Cause. July, at the time when the grass is in blossom or haymaking is going on. The little pollen sacs are extremely light, and are carried about by currents of air to great distances. Being inhaled, they settle on the mucous membrane of the respiratory passages, and, absorbing moisture from it, burst, and scatter minute granules over its surface, setting up intense irritation and acute catarrh. The greatest number of cases occur in June, but the number varies according to atmospheric conditions and the amount of pollen which is floating about in the air. It is a bad time for hay fever victims when the weather is hot and dry, and a heavy fall of rain is a cause of rejoicing, for it checks the complaint immediately.

Directly the cause is applied the symptoms begin, and may affect, at different times or all together, the lining membrane of the nose, eyes, mouth, throat, larynx, windpipe, and bronchial tubes. **Symptoms.** The parts begin to itch and smart, catarrh is set up, violent fits of sneezing occur, the eyes water, the nose runs with a watery, irritating fluid, the head aches from a spread of inflammation to the cavities in the frontal bone, the nose becomes stuffed up, and the poor patient feels absolutely miserable. The eyes are blood-shot and swollen, the tears trickle down the cheeks from blocking of the ducts which lead to the nose, and the eyes are so irritable that it is almost impossible for the patient to avoid rubbing them and thus increasing the trouble. The catarrh spreads backwards from the nose and mouth to the throat, and up the tubes to the ears, causing a certain amount of deafness. If it spreads farther through the larynx and windpipe to the bronchial tubes it sets up an asthmatic condition, with difficulty of breathing, wheezing, and dry hacking cough, a certain amount of phlegm being brought up later on. The first attacks are usually limited to the eyes and nose, but the later ones involve the deeper parts, and are often accompanied by asthma.

If hay fever is left to take its own course it may last for four or five weeks and return whenever the patient is exposed to its exciting cause. A certain number of cases seem to be produced by bright sunlight or ordinary dust, or to certain vegetable and animal odours, but it is hard to prove the absence of pollen grains even then, as these small bodies can be carried to such great distances. Exercise is often found to increase the severity of an attack by increasing the frequency of respiration, and therefore the amount of pollen inhaled.

The first step to be taken in the treatment of hay fever is to get away at once from the cause of irritation and escape the pollen grains;

Treatment. but this is not at all easy, for so many people are tied to work, pleasure, or duty that they must stop where they are and bear their trouble. If it is possible to go for a change, where will pollen be absent? A sea voyage is of all measures the most satisfactory, for at a certain distance from land the air is quite free from irritating particles. The next best place is the sea-coast, and a place should be chosen where the prevailing winds blow from the sea; if land winds blow, the pollen is soon at its work again. If the place is protected by high cliffs there is more hope of freedom for the sufferer. High mountain stations are sometimes beneficial, or large towns where grass and vegetation are conspicuous by their absence. It is always wise for hay fever patients to keep indoors as much as possible during the hot parts of the day and go out in the evening when it is getting cool; it is well for them to remember also that it is not only the pollen of grasses but also that of certain flowers that causes the disease, and therefore they should have no flowers or plants in the house. But as these measures are often beyond the patient's power, or have proved ineffectual, we must next consider what can be done to give relief by medicinal agents.

The general health must be improved by tonics, such as iron, quinine, nux vomica, and arsenic, and by general hygienic measures.

Local treatment is, however, of much more value than internal remedies, and very many different drugs have been advised for the purpose, and have been found useful in different cases. They should be tried in turn until one proves successful.

One excellent preparation which has but recently been used for this complaint is suprarenal extract. A 5 per cent. solution of the liquid extract of suprarenal gland should be sprayed in the mouth, nostrils, and eyes, when it often acts as a charm, relieving the intense irritation in a few minutes. It may be combined with 5-grain tablets of the extract, taken internally three or four times a day.

On a somewhat homœopathic principle the tincture of sweet vernal grass (*Anthoxanthum odoratum*) has been tried with success, 2 to 6 drops taken with water three times a day, with a 5 per cent. solution in water used as lotion to bathe the affected parts. Pollantin is another drug which was thought at one time to be almost a specific for hay fever. It is not quite this, but a few drops placed in the eyes or nostrils when an attack is coming on often check the watering of the

eyes, the sneezing, and general discomfort. The following lotion may be tried as a spray :—

PRESCRIPTION 71					
Boric acid	.	.	.	.	20 grains.
Menthol	.	.	.	.	4 grains.
Glyco-thymoline	.	.	.	.	2 drachms.
Solution of eucaine 4% to 2 ounces.					
For use in an atomiser or spray.					

Or a cocaine lotion may be used in the same way ; a 2 per cent. solution may with advantage be combined with an equal quantity of a 5 per cent. solution of the liquid extract of suprarenal gland, or this mixture may be used on cotton-wool to wipe over the eyes, and as a plug to be pushed up the nostrils. An ointment may be found useful to apply to the affected parts, composed as follows :—

PRESCRIPTION 72					
Hydrochloride of cocaine.	.	.	.	.	3 grains.
Thymol	.	.	.	.	3 grains.
Carbonate of bismuth	.	.	.	.	2 drachms.
Vaseline to 1 ounce.					

Or a sedative powder may be tried, to be puffed up the nose and into the throat by an insufflator (Fig. 31) :—

PRESCRIPTION 73					
Menthol	.	.	.	.	5 parts.
Salicylate of bismuth	.	.	.	.	15 parts.
Sugar of milk	.	.	.	.	15 parts.
Mix and make a powder. (Send ½ ounce.)					

A solution of quinine may be used as a nasal douche (order Col-lunarium quininol), 1 part of sulphate of quinine to 875 parts of water ; or a little of this lotion may be placed in the palm of the hand and sniffed up into the nostrils. This solution may easily be prepared at home in the following way : Take 1 pint of perfectly pure water, and dissolve in it a teaspoonful of common salt, which will remove all the irritating effects that pure water has upon a delicate mucous membrane, and then add a teaspoonful of the powder of sulphate of quinine, and shake it well. When the excess of quinine which the water will not dissolve has settled down, the lotion is ready for use in

the nasal douche. It is said that Professor Helmholtz, the celebrated scientist, was cured of hay fever by quinine solution. A weak solution of carbolic acid, 1 part in 500 of water, is also useful for a nasal douche.

A simple measure which is sometimes very efficacious in warding off an attack is to grease the inside of both nostrils as far up as you can reach with zinc ointment. This sticky material catches the pollen grains as they enter, and renders them innocuous. Many persons find much comfort and protection for their eyes by wearing dark glasses; these should certainly have a trial if bright light brings on the irritation.

Lastly, in the most severe cases relief may be obtained by cauterisation of the sensitive lining of the nose.

DISORDERS OF THE THROAT

The "throat" is a somewhat indefinite term when used in this connection, and must be considered to include the pharynx and some or all of the surrounding parts, such as the palate, tonsils, uvula, larynx, and upper part of the trachea. It is liable to many different affections, and may be injured by substances swallowed, such as bits of bone and hard portions of food, or by drinking very hot fluids or corrosive poisons. The latter accidents produce acute inflammation, and may be followed by very serious symptoms, such as suffocation and difficulty in swallowing, due to the extreme swelling of the mucous membrane. Affections of the throat vary in importance from a slight catarrh to such severe conditions as are caused by scarlet fever and diphtheria.

When we use the expression "sore throat" we refer in a general way to all the inflamed and painful conditions which affect the part, but the symptoms of sore throat are present in many different complaints, the causes and course and treatment of which are quite distinct.

We shall consider the chief varieties of sore throat under the following headings:—

1. Simple sore throat.
2. Clergyman's sore throat.
3. Relaxed throat
4. Follicular tonsillitis.
5. Acute tonsillitis, abscess of tonsils, or quinsy.
6. Poison sore throats.
7. Ulcerated sore throats.
8. Infectious sore throats.

SIMPLE SORE THROAT OR ACUTE INFLAMMATION (CATARRH)

In this complaint we have a very similar condition of the mucous membrane of the throat to that which we have described in nasal catarrh, and its most frequent cause is the same, namely,

Causes. exposure to damp and cold; indeed, it is very often simply an extension of inflammation from the mucous membrane of the nose. It is predisposed to by any condition which causes general debility and ill-health, such as overwork or living in unhealthy, ill-ventilated rooms, and it most commonly affects young people. One attack strongly predisposes to others, and many persons will always develop the complaint upon slight exposure to cold and damp or rapid changes of temperature. Rheumatic subjects are very liable to this form of sore throat.

The symptoms come on gradually, with slight fever, chilliness, headache, aching pains, and a general feeling of illness, soon followed

Symptoms. by a sore, dry, uncomfortable sensation in the throat, with pain on swallowing, slight hoarseness, and tendency to cough. The inflammation is liable to spread to the surrounding parts, upwards into the nose, and downwards into the larynx and wind-pipe. If the throat be examined, it is found to be red and swollen; the mucous membrane, which at first is dry and irritable, soon produces a more or less abundant secretion, which is sticky and tenacious, and causes constant "hawking" and attempts to expectorate. Such attacks are not at all dangerous, and usually two or three days of care and confinement to the house are all that is necessary for a cure.

The treatment is simple, and consists in the application externally of a linseed poultice, hot fomentation, or wet compress, and internally

Treatment. of soothing remedies. One of the best of these is glycerine of boracic acid, which should be painted with a brush over the inflamed parts several times a day, and may be combined with the use of lozenges, such as the tablets of (1) chlorate of potash, borax, and cocaine, or (2) of chloride of ammonium, or (3) of nitre. To some the use of a gargle is preferable, and for such the following can be recommended:—

PRESCRIPTION 74

Chlorate of potash	80 grains.
Boracic acid	80 grains.
Tincture of myrrh	2 drachms.
Water to 8 ounces.	

To be mixed with an equal quantity of warm water and used frequently.

In slight cases medicine will probably be unnecessary, but when fever is present it is well to take a good aperient and a few doses of the following mixture : —

PRESCRIPTION 75

Salicylate of soda	1 drachm.
Bicarbonate of potash	2 drachms.
Bromide of potash	80 grains.
Chloroform water to 8 ounces.	

An eighth part to be taken every 3 hours.

A tabloid of 5 grains of aspirin three times a day may be substituted for this mixture.

During convalescence the quinine and iron mixture (Pr. 77) should be taken three times a day after meals. The food, which during the attack should be very light and consist of slops, must be plentiful, nutritious, and sustaining; a glass of port wine may be taken once or twice a day with meals, and generally great care should be exercised until the throat has perfectly recovered.

CLERGYMAN'S SORE THROAT, OR CHRONIC INFLAMMATION

This form of sore throat is a chronic pharyngitis or inflammation of the pharynx, and in most cases there is a chronic laryngitis at the same time. It has also received the name of granular pharyngitis or follicular inflammation of the pharynx, because it is chiefly the little glands or follicles of the mucous membrane that are affected. The disease is met with in those persons who are overworked,

Causes. especially when their work necessitates constant use of the voice. It occurs frequently in clergymen, from preaching or reading aloud in church; in actors, from much and loud talking on the stage; in barristers, from long speeches in ill-ventilated courts; in singers, from straining the voice for large audiences; in schoolmasters and professional men, from long lectures; and in costermongers and street singers, from the strain involved in shouting and singing in the open air. There is little doubt that dust and dirt and irritating gases or chemical fumes increase the danger of voice strain, and that particular danger arises from using the voice when the throat is relaxed or only imperfectly recovered from catarrh.

The early symptoms seem quite unimportant. The patient feels an uneasy sensation at the back of the throat, as if there were something in it, and this gives a constant desire to clear the throat by "hawking"; he also has a frequent inclination to

swallow, as if to remove the irritation, but in neither way does he obtain relief. A little cough sets in, which is dry, irritating, and ineffectual. All these symptoms subside at once with a few days' rest, and if the throat be examined nothing very definite can be seen. But rest is seldom taken for a sufficiently long time, and the symptoms gradually grow worse; the throat becomes tired, and aches after speaking for shorter and shorter periods; the voice grows husky and indistinct, and a chronic form of inflammation is set up in the mucous membrane. The throat now shows distinct changes; the posterior wall of the pharynx—that is, the part that faces one when looking down the throat—is seen to be roughened and covered with small elevations, which are formed by the enlarged glands filled with secretion; the uvula is long, flabby, and relaxed; all the parts may be covered with thick mucus, which dries and crusts during the night and makes the symptoms often worse in the morning. In other cases the discharge is absent, and the throat looks dry and shiny, and may have raw patches or ulcerations on its surface. It now becomes impossible to use the voice, because doing so makes the symptoms severe; indeed, the voice may be entirely lost, and pain is complained of; the general health also suffers, and the patient grows debilitated and loses all interest in his work and ordinary pursuits.

The treatment is rest; and rest will work a cure if it is taken for a sufficiently long period. But the disease is most tedious and difficult to cure, and it is, of course, a serious thing for a busy professional or business man to throw up his occupation altogether. But the longer the disease has been neglected the longer will the rest have to be to ensure a cure. Rest in these cases, of course, refers to the throat and voice only, for rest of body is not at all necessary, the patient requiring, indeed, healthy exercise and amusement, and plenty of fresh air. Tonics, such as iron and quinine (Pr. 77), with change of air and scene, sea bathing or a daily cold bath, and good feeding, including a couple of glasses of port wine each day, brace up the general system and help the local measures. The use of tobacco is injurious, and should be entirely stopped. The indulgence in strong alcoholic drinks, except in great moderation, and the use of food either too hot or too much spiced, should be avoided, and chronic constipation should be corrected with mild aperients. Of special drugs, probably the most useful is iodide of potash, in 3-grain doses three times a day, but as this has a lowering and depressing effect it is well to combine with it some stimulating tonic, as follows:—

PRESCRIPTION 76

Tincture of cinchona bark	.	.	.	$\frac{1}{2}$ ounce.
Carbonate of ammonia	.	.	.	24 grains.
Iodide of potash	.	.	.	24 grains.
Tincture of orange	.	.	.	$2\frac{1}{2}$ drachms.
Chloroform water to 8 ounces.				

An eighth part to be taken 3 times a day before food.

Local treatment is of great importance, and may be employed in various forms. Drugs may be used mixed with glycerine, which renders the application thick and sticky; it should be painted freely on to the diseased surface with a large brush. Glycerine of tannic acid may be strongly recommended; this should be painted on two or three times a day. Tincture of iodine is also useful; at first it should be diluted with an equal part of water, and, if it seems to suit, it may later be applied undiluted. A silver preparation called argyrol, in the strength of 1 drachm to 1 ounce of water, may also be used to paint the throat; it causes no pain or smarting. Gargles are of little value, as they probably do not reach the diseased part, and are very brief in their action. Compound benzoic acid, chlorate of potash, chlorate of potash and borax, and chloride of ammonium are all useful lozenges.

Externally we may try a cold wet compress, applied when going to bed and worn all night, and in the morning the throat should be thoroughly sponged with cold water. In chronic cases it may be necessary to spend a winter and early spring abroad in some mild and equable climate, or to take a thorough course of the waters at some spa.

As precautionary measures against relapse, work should be resumed gradually and with care, the health receiving strict attention. If the sufferer is a man, the throat may be protected by growing a beard.

RELAXED SORE THROAT

This is very frequently the condition left by an imperfectly cured attack of acute inflammation, but it may arise also quite independently.

Causes. It is most common in people who are run down and out of health, or in those who live sedentary lives, and is not infrequently the result of smoking to excess, especially the smoking of cigarettes. The symptoms are a feeling of uneasiness at the back of the throat, a tendency to be constantly swallowing and to

Symptoms. "hawk" up phlegm, which is always most troublesome on getting up in the morning, and grows less after breakfast. There is some little pain on swallowing, especially of a hard morsel. The

cough is of a hacking character, and is either fruitless or results in the expectoration of a small quantity of thick phlegm, and sometimes of a few streaks of blood caused by the constant straining. Occasionally the cough goes on until the patient retches or is actually sick. There are no symptoms of general constitutional disturbance, such as fever or quickened pulse, but the health is poor, the patient describing himself as feeling "seedy," without having anything very definite to complain about. On the throat being examined it is seen to be swollen, somewhat reddened, and rough-looking; the uvula is often long and swollen, hanging low, and perhaps touching the back of the tongue, and is the cause of much of the trouble. The back of the pharynx is sore and dry, and usually has much thick mucus sticking to it.

There is often a good deal of difficulty in curing this affection, and the attention must be directed to improving the general health. Fresh

Treatment. air and exercise should be taken, and all coddling and sitting indoors given up at once. A healthy sharp walk is far better than sitting by the fire reading a book. A glass or two of port wine with meals, and a dose of tonic before or after them, should be taken. Of tonics, the bark and ammonia (Pr. 76) or the quinine and iron (Pr. 77) would be the most useful. As smoking is often a cause of this complaint, it should be given up altogether, or only indulged in with the greatest moderation; alcoholic drinks must be taken with circumspection, especially by the gouty. The bowels must be regulated, the digestion attended to, and any evident departures from health put right.

Local treatment must be combined with the general, but is of little use without it. The best application is glycerine of tannin, which should be applied freely to all the affected parts with a large brush three or four times a day; it is an active astringent, and braces up the relaxed parts. Tannin lozenges and red gum lozenges are beneficial. Another useful astringent is tincture of the perchloride of iron; 1 drachm to 1 ounce of water makes a useful paint, but it is strong, and blackens the parts to which it is applied. However, it gives great relief at times. A spray is a very satisfactory way in which to apply the astringent. A lotion consisting of 1 ounce of water with 5 to 20 grains of alum, or 5 to 15 grains of tannin, or 5 to 10 grains of sulphate of zinc, may be sprayed into the throat three times a day. Any of the stimulating inhalations (see Drugs and Prescriptions) may also be found useful.

FOLLICULAR TONSILLITIS

This is a form of sore throat that sometimes causes a good deal of anxiety, as it is liable to be mistaken for diphtheria. The tonsils are enlarged, and on their surface are a number of small dirty yellow patches, round or oval in shape, but quite limited to the tonsils. These structures always secrete a small amount of thick fluid from their little glands or follicles, but when they are inflamed the discharge may be unable to escape freely, and then collects in the glands, which become swollen and visible to the naked eye. The discharge oozes out on to the surface of the tonsils, and produces the patches, but does not form anything like a true membrane as in diphtheria. The material, which has a yellow, creamy consistence, can be easily wiped off with a brush. It can also be squeezed out of the enlarged glands by pressure on the tonsil, and may in this way be distinguished from the membrane of diphtheria, which is only detached with some difficulty, and leaves a sore and perhaps bleeding surface behind it. These patches are also likely to be mistaken for ulcers, but there is no abrasion of surface as in the latter complaint.

The treatment consists in the use of a gargle of equal parts of port wine and water; or alum, 5 grains to 1 ounce of water; or glyco-thymoline, 1 part to 3 of water; and of chlorate of potash or tannin lozenges. As many of these cases seem to be connected with the rheumatic poison, salicylate of soda is indicated, and may be employed, as in the mixture recommended for simple sore throat (Pr. 75). This is also useful in cases that are accompanied with feverish symptoms. The treatment should be completed with a good tonic, such as bark and ammonia (Pr. 76).

CHRONIC TONSILLITIS

A chronic inflammation of the tonsils produces the enlargement or hypertrophy of these organs so often met with in company with "adenoids," and it will be dealt with amongst the diseases of childhood.

ACUTE TONSILLITIS, ABSCESS OF TONSIL, QUINSY

Inflammatory sore throat, or quinsy, is a far more acute and serious illness than the forms of sore throat already described. It most commonly affects young people, but is not unfrequently met with amongst the middle-aged. One attack produces a strong pre-disposition to others; some people who have this tendency strongly marked are liable to almost annual attacks, and develop in this way great delicacy of the throat. The spring and autumn are the

Causes.

seasons during which quinsy is most prevalent, and this is probably due to the climatic conditions that then obtain. The usual exciting cause of quinsy is exposure to damp, cold, and wet, and although at one time the disease was supposed to be epidemic and contagious, it is probable that the appearance of a number of cases at one time is explained by the climatic conditions affecting them similarly.

The symptoms vary in severity according to the case, but fever is always present to some extent, with its accompaniments of headache,

Symptoms. chilliness, aching pains in the limbs, furred tongue, and loss of appetite. There may be even distinct shivering fits or rigors, and the fever may run up quite high, perhaps to 104° . The skin then is hot and dry, the face flushed, and the pulse very rapid, and there may be delirium at night. With these general symptoms the local trouble keeps pace. At first the throat is dry and sore, and the mucous membrane red and swollen, and these symptoms rapidly increase until there is severe pain with great swelling, and swallowing becomes most difficult. The pain shoots up into the ears and along the jaws, so that it is painful to talk or move the tongue or open the mouth. If the throat is examined the tonsils immediately attract attention, as they are red, greatly swollen, and may almost meet one another in the middle line. They can be distinctly felt from the outside in the neck, just below the angle of the jaw. The patient's speech is much altered, being thick and guttural. His throat feels as if it were blocked up, and the effort of swallowing is so painful that it is with the greatest difficulty that he can be persuaded to attempt it. Fluids are really more difficult to swallow than soft solids, as the latter fill up the space between the tonsils more, and require less movement of the parts. The swallowing is often so much impeded, and the movement of the palate so limited, that fluids are liable to pass upwards into the nose. If the neck is examined, enlarged glands may be felt running down on each side along the edge of the large muscle, and the whole neck is stiff and swollen, and painful when moved. The tonsils are not alone affected, for the uvula and soft palate and all the mucous membrane in their neighbourhood are swollen and red, and covered with a thick mucous discharge. In many cases the swelling is so severe that the patient feels as if he would be suffocated, but there is really no cause for fear, for the breathing is never seriously affected, and although the taking of nourishment is a severe trial, it is always possible to take enough to sustain the patient during the few days that the complaint is at its height. Fortunately there is very little danger

to life from quinsy, and death must be a rare occurrence. In the milder cases, and under appropriate treatment, the inflammation may subside and the patient get well without the formation of any matter, but in many cases an abscess forms. As this develops the swelling grows greater, until it finally reaches its crisis, and the abscess breaks and discharges. The amount of matter it contains may be only a few drops or several teaspoonfuls; it has a disagreeable odour and taste. The relief experienced by the breaking of the abscess is immense; the pain disappears rapidly, the difficulty of swallowing passes off, and the feverish symptoms subside.

The course of a case of quinsy may often be shortened by several days if the bursting of the abscess is hastened by a timely prick with a surgeon's knife. Much anxiety is sometimes felt by patients lest the abscess should suddenly break during sleep and cause suffocation, but such an accident is practically unknown, and the idea may be dismissed. Many a case ends by the breaking of the abscess almost without the patient being aware of it, the matter being either swallowed or expectorated, and it might be altogether overlooked were it not for the unpleasant taste and smell of the discharge. An average time for a quinsy to run its course is five or six days, but there is unfortunately a great likelihood of the other tonsil becoming inflamed, and of an abscess being formed in it after the first one has begun to get well.

A good plan is to get some ice and let the patient suck small pieces until the inflammation is allayed. A gargle also (Pr. 74) is useful in the early stages, if the strain of using it does not cause too much pain. Lozenges, too, give relief, such as (1) the chlorate of potash, borax, and cocaine, or (2) guaiacum and sulphur. If these measures do not check the inflammation, put the patient to bed and apply a thoroughly hot linseed poultice across the throat, reaching from ear to ear, and give him a good purge of Epsom salts or mineral water. The best medicines to start with are aconite for children, and salicylate of soda for adults, and the mixtures recommended for nasal catarrh (p. 229) may be used in the way there advised. Warmth internally should replace the ice; and some measures which may be suitably employed are a gargle of warm milk and water, the inhalation of steam, the chlorate of potash gargle (Pr. 74), and frequent painting with glycerine of boracic acid.

As there is often much trouble in swallowing, and the parts may be too sore to use a gargle and too tender to be painted, it may be necessary to treat the throat with a spray; and one containing

chlorate of potash, boracic acid, and hydrochloride of cocaine, 5 grains of each to a tablespoonful of water, may be used; or boracic acid or guaiacum in powder may be applied with an insufflator. Whilst the patient feels ill and his temperature is raised, he must keep in bed; his room must be kept warm (about 65°), and his food consist of slops, fluids, or preferably soft solids—bread-and-milk, jellies, light milk puddings, and milk foods generally. He may drink as freely as he can of water, milk and water, barley-water, beef-tea, etc.

As the symptoms subside, and especially as the fever disappears, the salicylate of soda mixture must be given less frequently, and must be stopped altogether when the temperature reaches normal. The poulticing and warm treatment also must be replaced by a warm covering for the throat of cotton-wool or gamgee tissue or flannel, and the glycerine of tannic acid may be painted on the tonsils, or a gargle of equal quantities of port wine and water, or alum, 5 grains to 1 ounce of water, may be used to tone up the flabby parts. The surgeon's assistance will be required to open an abscess of the tonsil when it forms. The operation can be rendered almost painless by painting the part with cocaine, and at the worst is only a matter of a few seconds' sharp pain, with perhaps several days' less suffering as a reward.

During convalescence the patient will require to be fed up and nursed back to strength: a glass of port wine twice a day, some extra food between meals, and a good tonic, such as bark and ammonia (Pr. 76), may be advised. Finally, it is usually well to have a change of air to the seaside or other bracing place, so as to make the recovery complete and as far as possible guard against the well-known tendency of quinsy to recur.

POISON THROATS, HOSPITAL SORE THROATS

If many persons in the same house develop sore throat, suspicion should be aroused as to the state of the drains, and they should be investigated at once. There may be some blocking of the soil pipes from the water-closet, or some imperfection in the traps or ventilating shaft, or a leak in a pipe connecting with the sewers, by which sewer gas leaks or is forced into the house. If this sewer gas is concentrated, or finds entrance to the sleeping rooms, much ill-health is the result, and such symptoms as headaches, nausea, vomiting, diarrhoea, sore throats, and general malaise show themselves. Similar troubles may arise from the presence in the neighbourhood of the house of a stagnant

pond, the smell of which is carried into the rooms, or from an imperfectly cleansed cesspool. The condition of the throat in these circumstances is often alarming: the inflamed parts become coated with a thick discharge, ulcerations or sore patches form, and the patient feels ill and feverish.

A very similar form of throat is met with in nurses and others who work in hospital wards, and is caused by the vitiated air, overwork, absence of outdoor exercise and fresh air which their life entails. Those who suffer in this way are nearly always in a poor state of health, and liable to be infected by any germs with which they come in contact. The most prominent symptom they exhibit, apart from the sore throat, is very high fever, which may run up to 103° or 104° . They require for treatment instant removal from their insanitary surroundings, the frequent use of antiseptic gargles, good food, tonics, and change of air during convalescence. Unfortunately the recovery is often very slow, and a long holiday is usually necessary.

The following mixture should be taken:—

PRESCRIPTION 77

Sulphate of quinine	.	.	.	8 grains.
Tincture of steel	.	.	.	80 drops.
Spirits of chloroform	.	.	.	$2\frac{1}{2}$ drachms.
Water	to 8 ounces.			

An eighth part to be taken 3 times a day.

The following antiseptic gargles may be recommended:—

PRESCRIPTION 78

Boracic acid	.	.	.	.	2 drachms.
Tincture of myrrh	.	.	.	.	2 drachms.
Water	to 8 ounces.				

To be used as a gargle frequently with an equal quantity of warm water.

PRESCRIPTION 79

Carbolic acid	.	.	.	.	30 drops.
Hydrochloride of cocaine	.	.	.	.	6 grains.
Glycerine of borax	.	.	.	.	4 drachms.
Rose water	to 8 ounces.				

To be warmed and used as a gargle.

Formamint tablets are valuable as antiseptic lozenges.

ULCERATED SORE THROAT

Is not a special disease in itself. An ulcer is a sore place, and is caused by the destruction of the surface of the mucous membrane, and this may occur in all forms of sore throat. It is especially common in the poison throats we have just described, as occurring in persons at work in hospitals, and in "drain" throats. Ulceration is also common in many sore throats that form part of general diseases, such as scarlet fever, diphtheria, cancer, syphilis, consumption, and indigestion. The white spots caused by accumulated secretion in chronic inflammation of the tonsils are very commonly mistaken for ulcers, but in this condition there is no raw surface, as can be seen if the secretion be removed by a gargle or a brush.

INFECTIOUS SORE THROAT

May be referred to here, but will be more fully described under the diseases producing it. Many forms of sore throat are due to the presence of germs, and by an examination of the discharge these can be discovered; and there are three forms of this affection which are undoubtedly infectious—namely, the influenza, scarlet fever, and diphtheria forms.

The influenza throat has nothing particularly distinctive in its appearance, and must be recognised by the general symptoms and course of the attack. Scarlet fever and diphtheria throats, on the other hand, have very definite characters by which to recognise them, and our account of sore throats would hardly be complete without briefly giving the important points of difference. Nothing causes more anxiety to both doctor and patient than a bad sore throat the nature of which is uncertain.

The scarlet fever throat is similar in appearance to that of quinsy; the tonsils, palate, uvula, and pharynx are swollen and red, the tonsils are much enlarged, and have patches of thick secretion dotted over their surface. Later, ulcers may appear or an abscess form. The great point to be noticed is the general symptoms, for in scarlet fever these are very severe; the pulse is quick, the temperature high, and the patient very ill. The appearance of the characteristic eruption settles the question.

In diphtheria the same parts are affected, and severe symptoms are present, but the characteristic point is the appearance on the throat,

and especially on the tonsils, of distinct patches of membrane of a white, greyish, or brownish colour. The patches at first are small and separate, but they rapidly spread and join together. **Diphtheria** These patches of membrane can only be removed with **Throat.** difficulty, and if torn off leave a raw surface. The one means by which their nature can be cleared up and a definite conclusion obtained is by taking off some of the discharge on a piece of cotton-wool and sending it to be examined by an expert. If the special bacillus of diphtheria is found the case must be treated as one of diphtheria.

AFFECTIONS OF THE VOICE

There are so many conditions which affect the voice that it is well we should know them and be in a position to distinguish those that are serious from those that are unimportant. The voice, as we have already shown, is produced by the vocal cords inside the larynx, but it is much affected in its *timbre* by the parts above, which act as resonating cavities and turn the voice sounds in different directions. These parts include the epiglottis, pharynx, nasal cavities, mouth, soft and hard palate, tongue, and lips. Affections of all these parts may therefore alter the quality and tone of the voice. The voice may be weak simply from want of force in the expiration, the air being driven outwards with insufficient power. This occurs in those cases in which the respiratory organs are affected. The voice may be tremulous, as in the feebleness of old age or nervousness, in which the nervous system fails to control the muscles used in vocalisation.

In other cases the voice may be absent altogether, or only whispered sounds can be produced. This condition is caused by anything that prevents the vocal cords from being placed in apposition, such as loss of power over the small muscles of the larynx produced by disease or nervous affection.

One of the commonest alterations of the voice is that of hoarseness or a loss of the musical quality, caused by anything that interferes with regular and free vibration of the vocal cords, such as inflammatory or other swelling or thickening, growths, or paralysis.

We can divide the various causes of voice affections into two classes: (1) those that act indirectly upon the larynx through the nervous system, and (2) those which affect the larynx directly by disease of its various structures. These classes correspond to what are called functional and organic causes.

NERVOUS VOICE AFFECTIONS

The chief functional cause of voice affections is hysteria and its allied conditions, all of which are of nervous origin. Nervous loss of voice usually comes on quite suddenly, without any very definite reason. The patient is quite unable to utter a word, or she may be able to talk in a hardly audible whisper, and yet all the time she may be in perfect health, and quite free from pain or cough or any trouble which points to an affection of the larynx. This condition is called aphonia, or voicelessness, and is due simply to want of will-power. A similar state is occasionally met with in men who have received a great nervous shock, and whose nervous systems are broken down by work, worry, or dissipation.

Certain diseases of the nervous system also produce aphonia, such as tumours of the brain or injuries of the nerves which control the muscles of the larynx, but these can hardly be mistaken for the simpler forms we have been describing, as other prominent symptoms will be present.

The treatment of nervous loss of voice is usually very successful, many cases being cured on the spot by the application to the throat of the electric current; but even if the first trial is unsuccessful the treatment should not be given up in despair, but continued daily for from five to ten minutes, gradually increasing the strength of the current. Often the voice returns for a time after this treatment and gradually goes again, but perseverance will usually be rewarded with success.

Another form of loss of voice is produced by overuse, especially if there is misuse also. It occurs in public singers, clergymen and other public speakers, and its treatment consists in rest, all speaking and singing being absolutely given up, and only recommenced gradually and with great care.

The voice is often much altered by conditions in other parts, the larynx itself being healthy. For example, a child who has adenoids or enlarged tonsils, or anyone with a sore or swollen throat, will talk with a thick, rough voice—"speaking through the nose, as it is called." The popular expression is an unfortunate one, for it is just those conditions which block the back of the nose and prevent the passage of the air through it that cause this change of voice. A highly arched or a cleft palate also gives a peculiar tone to the voice.

Each cause must receive its appropriate treatment, but we may here mention a few useful throat lozenges which have a good effect on the voice. The chlorate of potash, boracic, and cocaine tabloids are

excellent; they are much compressed and quite small, and may be kept comfortably under the tongue and allowed slowly to dissolve. Menthol and eucalyptus jujubes are sedative and softening to the swollen mucous membranes. The compound benzoic acid tabloids encourage the secretion of mucus and moisten a dry throat, and are also soothing. A most useful class of remedies for hoarseness is formed by the various inhalations. These, with the tabloids, will be set out in the chapter on Drugs and Prescriptions; here it will be sufficient just to mention eucalyptus oil and compound tincture of benzoin (for inhalation with steam), and chloride of ammonium (in a special inhaler), as some of the best sedatives for this purpose.

INFLAMMATION OF THE LARYNX

Laryngitis, or inflammation of the larynx, the one organic voice affection with which we have to do, is most commonly caused by "catching cold," and is in many cases due to the spread of a catarrh of the mucous membrane of the throat. If during an ordinary cold the patient feels more ill and grows restless and anxious, it is probable that the larynx has become involved. The inflammation may also spread upwards along the windpipe from the lining of the bronchial tubes. Laryngitis occurs, too, as a complication of many general diseases, such as measles, scarlet fever, and influenza, and may under such circumstances be the chief source of danger. Accidents may produce it; the drinking of very hot water or the inhalation of noxious fumes being frequently followed by a very rapid and dangerous form of the complaint. The mild form which accompanies an ordinary cold would popularly be called a "sore throat"; it is not at all a serious matter, and usually disappears in the course of three or four days under appropriate treatment; but it can be easily understood by those who have read a description of the anatomy of the larynx that the inflammation and consequent swelling of the lining of this organ may produce very dire results. The body depends for its supply of oxygen upon the narrow chink of the glottis being kept open and free, and if this orifice be closed suffocation and death will rapidly follow. In the old, the debilitated, the diseased, and in children, this affection must be looked upon as dangerous, and receive very careful attention. The most dangerous attacks are those that accompany the severe general diseases and those that are produced by swallowing boiling fluids, for in these a condition of inflammatory

swelling often supervenes with great rapidity, and the patient's life is suddenly in jeopardy.

Fortunately the mild form resulting from cold is infinitely the most common, and need excite no alarm. Changes in the voice are the most prominent symptom. At first there is simply a **Symptoms.** slight thickness or huskiness, which is made worse by talking. This may increase up to loss of voice, the patient being only able to express himself in an almost inaudible whisper. There is a feeling of irritation in the throat, with a sensation of tightness or tickling in the region of the thyroid cartilage (Adam's apple), producing a constant desire to clear the throat and to swallow, both of which actions produce pain. The expectoration is small in quantity, and is at first only thin, watery fluid, like saliva, but it gradually becomes thicker and sticky as the inflammation subsides. There is usually some irritating, hacking cough, to which the name of "croupy" has been given, and the breathing increases somewhat in rapidity, and is rather difficult and noisy. Slight fever and increase of the pulse-rate are present in most cases. Should the appropriate treatment be now carried out all the symptoms gradually subside, but if this is neglected the breathing grows more and more troublesome, the air enters the chest with much difficulty and straining, the patient becomes exhausted and blue, and struggles to get fresh oxygen into his lungs, and probably death from suffocation will then end the struggle. Laryngitis must therefore receive early and careful treatment.

Place the patient in a warm room, and keep the air moist, at about 65° or 70°, and at the same time fresh, by careful ventilation. A fire **Treatment.** is the best of ventilators, and a bronchitis kettle will both warm and moisten the air. Next apply a hot linseed poultice all over the front of the throat, and prepare a jug of boiling water with a few drops of eucalyptus oil in it, and let him inhale the steam. Clear the bowels with a purge, and let the diet be light and simple—slops at first, such as milk, gruel, beef-tea, bread and milk, and milk puddings. Let the patient sip warm milk, barley-water, and black-currant tea, and avoid all talking. When he goes to bed let him have a hot bath, a hot glass of grog, and a dose to make him sweat. For an adult 10 grains of Dover's powder would be suitable for this purpose, but to children it would be better to give 1-drop doses of tincture of aconite every hour for three or four doses. This treatment will soon give relief, and probably by the next morning the symptoms

will have begun to subside, but for a few days the patient must be very careful to avoid catching cold.

Other inhalations may be found of value. In the early stage of laryngitis a teaspoonful of Friar's balsam in 1 pint of hot water is soothing, and in the later stages, especially when there is much expectoration, the following is a good stimulant:—

PRESCRIPTION 89.

Oil of Scotch pine	}	of either . 40 drops.
Or pure terebene		
Light carbonate of magnesia		. . 20 grains.
Water to 1 ounce.		

A teaspoonful to be added to 1 pint of hot water at the temperature of 150° and the steam inhaled for 5 to 10 minutes. (Water of this temperature is obtained by adding $\frac{2}{3}$ pint of boiling water to $\frac{1}{3}$ pint of cold.)

In those cases in which fever is at all a prominent symptom it would be well to administer some of the salicylate of soda or aconite mixtures, according to the age of the patient (p. 229), and if cough is troublesome and painful the cough mixture (Pr. 82).

If the foregoing treatment is not rapidly followed by improvement it would always be wisest to get medical assistance, for we must remember that even in the most extreme cases the patient's life may be saved by the operation of opening the windpipe (tracheotomy), and also that some cases of laryngitis are due to hidden diphtheria, which is a most fatal form of this disease, and requires special treatment to counteract the poison as early as possible.

One attack of laryngitis greatly predisposes to others in the future; it may also end in a chronic inflammation very similar in its symptoms to those described as clergyman's sore throat. If the symptoms of hoarseness and irritation of the larynx continue for at all an unusual length of time it is wise to consult a medical man, as they may be caused by conditions which domestic treatment cannot cure. Ulceration of the vocal cords may exist, and is sometimes of a tubercular nature; small tumours, either cancerous or innocent, also occasionally grow on the cords, and can only be discovered and treated by a medical man.

The interior of the larynx can be seen and fully examined by an instrument called a laryngoscope (Fig. 32). This consists of two mirrors, one of which (the larger) is fixed by a band to the forehead of the operator; the other is fixed at an angle to the end of a long

handle. The large mirror is placed in such a position that it reflects the light of a lamp into the patient's mouth. The operator then warms the small mirror so that the breath shall not cloud it, and passes it into the patient's mouth beyond the back of the tongue, at the same time



Fig. 32.—LARYNGOSCOPE AND SMALL MIRROR.

drawing out the tongue with the other hand. The small mirror reflects the light down into the larynx and lights it up, and a picture of the inside of the larynx can be seen in it by the operator.

COUGH

What is a cough? It may be defined as a violent expiratory effort. A deep breath is taken, the upper opening of the windpipe (glottis) is then closed, and is suddenly burst open by the forcible expulsion of air. With the sudden outward rush of air thus produced, any foreign body or collection of mucus is carried upwards into the throat and expectorated. The most common cause of cough is the presence in the air passages of some irritant material. A cough is

such a common affection, and is carried out in such an involuntary way, that we hardly realise how complicated is the mechanism which is necessary, and how serious it would be if any part of it were to break down and fail to act. It is necessary for the lining membrane of the air passages to be sensitive, and quickly to realise the presence of some peccant substance; the nerves which obtain this knowledge must convey it rapidly to the brain; that portion of the nervous system must be alert and ready to act; the nerves must convey back the intelligence to the muscles of the chest, abdomen, and larynx without delay, and all these many muscles must carry out an intricate combination of movements, or we should choke—and all this for a little bit of mucus! Surely it is true that we are “wonderfully made”!

The causes of cough are as many as the forms of irritation of the air passages, but when we say we have “got a cough” we usually mean we have a cold on the chest, or, in medical language, a slight bronchitis. This is the most frequent cause, but cough is a most distressing symptom in consumption and inflammation of the lungs. In throat affections it is usually very troublesome, enlarged tonsils or a swollen and flabby uvula producing the most irritating cough, which seems to give no relief, as it is impossible to expectorate these sources of irritation. Besides the various forms of irritation caused by affections of the throat, windpipe, bronchial tubes, and lungs, there are others which to the uninitiated come as rather a surprise. For instance, we have most of us met with what are called “stomach coughs” in children, but few of us could explain their production. It is caused by some indigestible matter in the stomach, or by loaded bowels, acting on the nerves which control those organs. One of the great nerves—the pneumogastric—gives off branches to both the stomach and the lungs, and it is through this close connection in nerve supply that the stomach cough is explained. For such a cough all sorts of cough remedies may be used without benefit, but a good purge clears the bowel and remedies the irritation to which the cough owed its origin.

In adults a somewhat similar condition is met with. A patient may have some slight irritation of his throat or windpipe which causes him little trouble, but some time after he has had a meal the trouble begins, and the cough continues incessantly, until he gets blue in the face and perhaps vomits up all the food he has taken. This condition requires no ordinary cough mixture, but will almost certainly be cured by the

following treatment:—Take half a teaspoonful to a teaspoonful of bicarbonate of soda and dissolve it in half a tumblerful of water, and sip it until it is finished or the cough is relieved. The treatment evidently acts either by relieving irritation of the stomach or by neutralising excessive acidity.

Another branch of the pneumogastric nerve is supplied to the ear, and may probably explain some interesting but rare cases of cough caused by ear trouble, in which a constant and irritating cough has been set up by a mass of hardened wax in one of the ears. When this is removed by syringing the cough is cured.

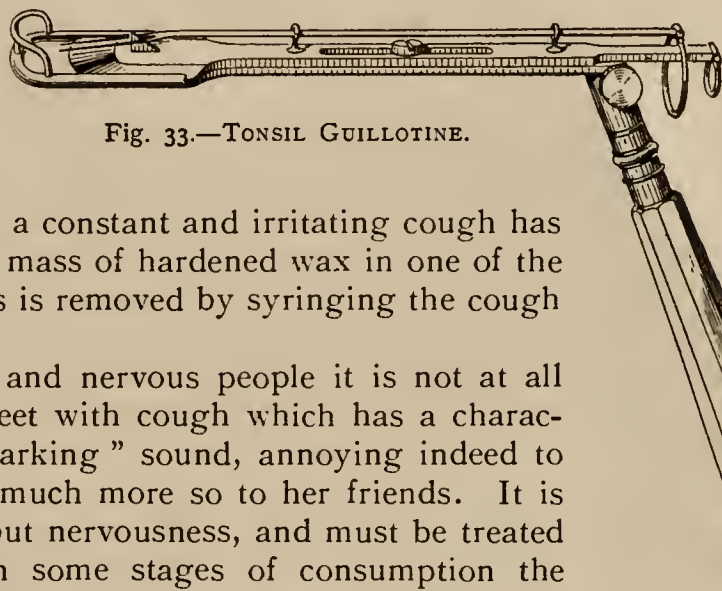


Fig. 33.—TONSIL GUILLOTINE.

In hysterical and nervous people it is not at all uncommon to meet with cough which has a characteristic noisy “barking” sound, annoying indeed to the patient, but much more so to her friends. It is due to nothing but nervousness, and must be treated accordingly. In some stages of consumption the cough is dry, hacking, and ineffectual, but should be quite sufficient to arouse suspicion and lead to an examination of the chest, by which this disease may be diagnosed. In asthma, also, the cough has a peculiar character, which has been described as “suffocative.” It comes on in violent spasms with the difficulty of breathing. In whooping cough the sound is sufficiently distinctive to enable us to recognise the disease, and in croup, in which the larynx is swollen and its orifice partly closed, the alarming “croupy” noise is quite characteristic.

We have now described the causes of cough, and it is necessary to recognise which of these is present in each particular case before we can treat it in a rational way. If the cause is in the throat, local treatment is of chief use. The inflamed tonsils and swollen mucous membrane must be soothed with sedative gargles or painted with thick liquids containing drugs (*see Simple Sore Throat*, p. 237).

If the tonsils are chronically enlarged and cannot be reduced in size they should be removed by the guillotine, a special instrument

made for this operation (Fig. 33); and if the uvula is long and is constantly causing trouble, a piece of this may also be easily removed.

For coughs associated with diseases of the larynx and windpipe nothing is of such use as the inhalation of drugs with steam (*see Inflammation of Larynx*, p. 251).

Next a few words on cough mixtures will be useful. It is no good, as we have already hinted, to have a favourite prescription and use it for all cases of cough. It is necessary to make a few simple observations first and decide what we want the medicine to do, and then choose from among the several prescriptions which are about to be given. Let us suppose that it is clear the cough is not due to the conditions whose treatment we have already discussed. It is not due to throat or larynx, but is caused by a definite cold on the chest. Next we must consider, Is the cough dry (that is, without expectoration), painful, and accompanied with a soreness under the breast-bone, or is it loose, free, and with much expectoration? The former will require soothing, sedative medicine; the latter, stimulating drugs, which will hasten the clearing of the tubes. If we were to take sedative medicines when there is much expectoration, the sensitiveness of the mucous membrane would be removed and the cough would be eased, but the phlegm would collect in large quantities in the tubes and obstruct the breathing. If the cough is dry, irritable, and the phlegm brought up with difficulty, and soreness is felt, either of the following sedative mixtures is suitable:—

PRESCRIPTION 81

Paregoric elixir	.	.	.	.	2½ drachms.
Syrup of tolu	.	.	.	.	½ ounce.
Sweet spirits of nitre	.	.	.	.	2½ drachms.
Water to 8 ounces.					

An eighth part to be taken every 3 or 4 hours (a teaspoonful for children).

PRESCRIPTION 82

Glyco-heroin	.	.	.	.	1 ounce.
Ipecacuanha wine	.	.	.	.	40 drops.
Syrup of tolu	.	.	.	.	½ ounce.
Water to 8 ounces.					

An eighth part to be taken every 3 or 4 hours.

Forty drops of solution of hydrochlorate of morphia or 80 drops of tincture of gelsemium may be used in place of the glyco-heroin, but this mixture would not then be suitable for children.

When fever is present, tincture of aconite, 3 drops, may be usefully added to each dose of the medicine for adults, or 1 drop for children.

The following medicines are thick and sticky, and soothing to the throat, and will relieve a cough due to an irritable throat. Such preparations receive the name of linctus :—

PRESCRIPTION 83

Confection of hips	100 grains.
Powdered tragacanth	6 grains.
Syrup of poppies	36 drops.
Vinegar of squills	36 drops.
Acetic acid	2 drops.
Ipecacuanha wine	30 drops.
Boiling water to 1 ounce.	

A teaspoonful to be taken every 3 or 4 hours.

PRESCRIPTION 84

Paregoric elixir	2 drachms.
Oxymel of squills	3 drachms.
Syrup of tolu	3 drachms.

A teaspoonful to be taken every 3 or 4 hours.

A useful lozenge for these cases is the morphia and ipecacuanha lozenge.

If there is much expectoration, or the phlegm is thick and sticky, a stimulating medicine is, as we have said, required, and some of the best stimulating expectorants are squills, senega, and tolu combined with carbonate of ammonia (the last being particularly useful), as in the following mixture :—

PRESCRIPTION 85

Carbonate of ammonia	24 grains.
Tincture of senega	5 drachms.
Syrup of squills	$\frac{1}{2}$ ounce.
Syrup of tolu	1 ounce.
Chloroform water to 8 ounces.	

An eighth part to be taken every 3 or 4 hours.

When there is a large amount of watery expectoration, with constant cough and some difficulty of breathing, careful use may be made of the following medicine; but if a few doses do not show distinct relief, and decrease in the amount of expectoration, it had better be discontinued in favour of the preceding stimulating mixture.

PRESCRIPTION 86

Dilute sulphuric acid	.	.	.	80	drops.
Syrup of poppies	.	.	.	$\frac{1}{2}$	ounce.
Tincture of squills	.	.	.	2	drachms.
Spear-mint water to 8 ounces.					

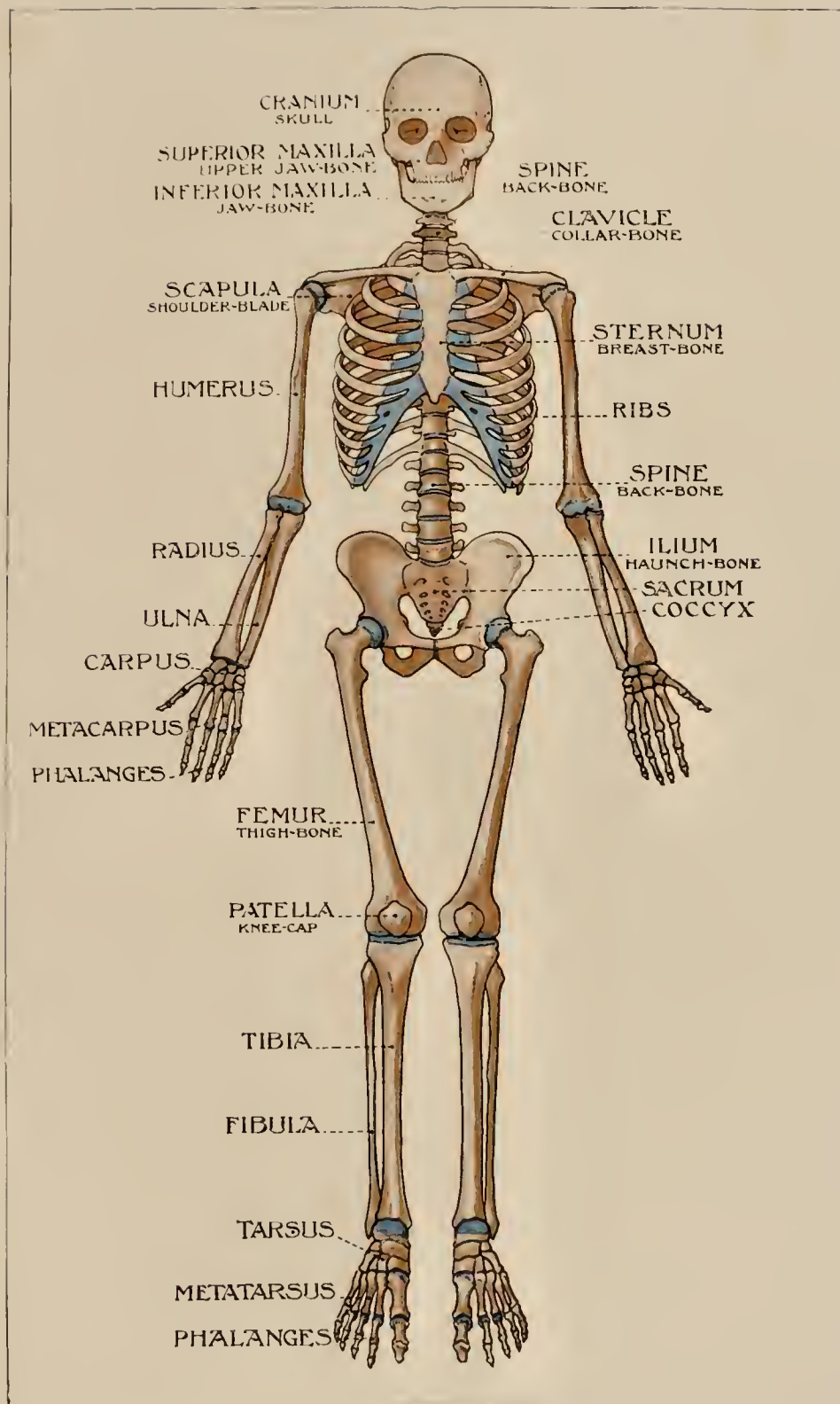
An eighth part to be taken every 3 or 4 hours.

All cough mixtures must be administered with care, and discontinued as soon as possible, as they almost always contain drugs that are liable to upset the digestion, spoil the appetite, and even produce vomiting.

The cough of chronic bronchitis is best relieved by the stimulating carbonate of ammonia mixture (Pr. 85), combined with some stimulating antiseptic inhalation, such as those of Scotch pine oil or terebene (Pr. 80).

Many simple remedies are found useful for coughs, such as a piece of Spanish liquorice, medicated glycerine jujubes, simple lozenges of chlorate of potash, tannin, or borax, combined with menthol or eucalyptus; black-currant jelly, barley-water, linseed tea, etc.

When the cough is sufficiently severe to require confinement to bed—and this is really always advisable if there is fever accompanying it—some local treatment should be employed. A good hot linseed poultice to the throat and upper part of the chest will give great relief, and by adding a little mustard to it its effect may be increased. Rubbing the chest also may be tried, either with the compound camphor or the turpentine and acetic acid liniments.



THE HUMAN SKELETON.

CHAPTER XIV

DISORDERS OF THE BRONCHIAL TUBES AND LUNGS

Acute Bronchitis—Chronic Bronchitis—Expectoration—Asthma—Shortness of Breath—Broncho-pneumonia—Congestion of the Lungs—Emphysema—Pleurisy—Consumption

ACUTE BRONCHITIS

Is an inflammation of the mucous membrane of the bronchial tubes, and in its mild forms is what we call a cold on the chest. Usually it is only the large bronchial tubes that are affected, and the disease is not then a dangerous one, but sometimes the small tubes are involved from the beginning of the illness, or the inflammation gradually spreads from the large tubes to the smaller ones, and the deeper it goes the more serious becomes the attack. The name of capillary bronchitis is given to the more serious condition, from the word *capilla*, meaning a hair, as the tubes then affected are so minute. This disease gradually merges into broncho-pneumonia from involvement of the lung tissue itself, which is in direct connection with the smallest tubes. We see, then, that cases of bronchitis vary in importance, according to the parts involved, from a slight cold to an inflammation of the lungs. In this disease, as in so many others, the old proverb "A stitch in time saves nine" is verified. Careful attention to a slight bronchitis may save a very serious illness.

The chief cause of bronchitis is exposure to cold and wet, and it is but natural, therefore, that it should be a disease of the winter months, and of damp and variable climates. As might be expected, also, it is most commonly met with in those whose occupations involve much exposure; for this reason it is more common in men than in women, and in the poor than the rich. As the old and the very young are less able to bear exposure to cold, bronchitis affects them more often than the mature; it involves the delicate and debilitated more than the strong and healthy, the overworked and underfed more than the prosperous and comfortable. Any chronic maladies, such

as gout, diabetes, or Bright's disease, predispose to it, and if a person has been once affected by it there is always a strong tendency to a recurrence, which can be avoided only by special care. The mode of life in other ways also is a factor in the case, for those who live in warm rooms, ill-ventilated workshops, or unhygienic surroundings generally run greater risks than those blessed with comfortable and healthy homes. Certain trades, too, are particularly dangerous from this point of view, for workers who are obliged to inhale much irritating matter, such as cotton, steel, or charcoal, develop a sensitive condition of the bronchial mucous membrane, which makes them a ready prey. The effects of cold may act in many ways: the clothes may get soaked, and circumstances may prevent their being changed; the feet may get wet; the body may get chilled rapidly when hot, as after exercise; the weather may change suddenly, and cold be caught through insufficient clothes. This last condition is a particularly fruitful cause. A sudden change of weather from hot to cold, or from dry to damp, or change of wind from south to east, is followed by many cases of bronchitis; and although the complaint cannot be looked upon as "catching," yet climatic changes affecting many people at the same time may produce it in almost an epidemic form.

The symptoms, therefore, which usher in an attack of bronchitis are simply those of a cold. There are shivering and sneezing, chilliness and a feeling of illness, headache and a little fever, **Symptoms.** a slight cough and soreness of the chest. Generally there are nasal catarrh, sore throat, watery eyes, slight hoarseness, the inflammatory trouble evidently affecting all the mucous membranes and gradually spreading lower along the air passages. If the temperature be taken on going to bed it is found to be slightly raised, perhaps 1° —to about 99.5° ; the pulse is more rapid than normal, but only by about 10 beats; the respiration is quickened to 25 breaths a minute. This is the time for the employment of efficient treatment. But if the cold be neglected the symptoms get worse; the cough grows more troublesome, and comes on in fits excited by slight causes, as a gust of cold air, movement or talking; soreness in the chest is more severe, is felt beneath the upper part of the breast-bone, and is much increased by coughing. In the early stage there is no expectoration, the mucous membrane being dry, swollen, and sensitive, but phlegm soon begins to form. At first it is only slight, and consists of a thin, watery fluid; after a time, however, it grows free, thick, and yellow. It may be so thick and sticky that the greatest difficulty is experienced in coughing

it up, and the violent straining may cause little streaks of blood to be mixed with it. This is alarming at first, but does not indicate any danger, being due to some minute blood-vessels of the mucous membrane having given way.

If now the inflammation spreads into the smallest tubes, even more serious symptoms develop, and there is really cause for anxiety. This complication is more common in children than in adults. The breathing gets much more difficult and laboured, the respirations are increased in rapidity, inspiration is carried out with great energy, many extra muscles being brought into use; it becomes almost impossible to breathe whilst lying down, and the patient has to sit propped up with pillows in bed, or even in a chair. The cough grows more violent and exhausting, the expectoration is most profuse, and is only got rid of with the greatest difficulty. The temperature may rise and the pulse grow quick, and the patient become collapsed and exhausted. The mucus collects in the tubes, expectoration ceases, blueness of the face and extremities appears, and death may result from suffocation and prostration. Fortunately, capillary bronchitis occurs in only a small number of cases, and ordinarily the symptoms never get so serious.

An ordinary mild attack of bronchitis lasts from ten days to a fortnight, but in the severer cases it is a much longer illness. The

Treatment. knowledge that a neglected attack may become so serious should put us on our guard, and even the mildest cases should be carefully treated, and no risks run by going out of doors. It is far better to be over-careful than to treat the matter lightly and suffer accordingly. It is always the wisest course to stop indoors with an attack of bronchitis, however important our engagements or great our disappointment at missing our pleasures. A few days in a warm room will often cure the attack, and as it is usual for bronchitis to occur in the cold weather a fire is almost always needed. The temperature of the room should be kept at about 65°, and the bedroom should have a fire in it also, as nothing is so bad as going from a warm room into a cold one, for in this way the cough is sure to be made more troublesome, and may cause a sleepless night. A good plan is to have a hot bath, or to put the feet in mustard and water, go to bed early, and have a hot bottle to warm the bed. If the chest feels sore, put on a hot linseed poultice, or give it a good rubbing with camphorated oil until it is red. A hot drink—a glassful of hot spirit and water or a basin of gruel—will help to make you sweat and do you good. During the

night be careful not to throw the clothes off, or all the good may be undone.

If these measures have not successfully checked the attack, the patient must stop in bed and continue the linseed poultices. A fresh poultice should be put on every four hours; each should be kept on for two hours, and a piece of cotton wool should be put over the chest during the intervals. The poultices may be applied either to the back or to the chest, the advantage of putting them on the back being that the weight of the poultice is less felt and the breathing is not so impeded. For a poultice to be of any good it must be thoroughly hot. Stimulating liniments act in the same way as poultices by bringing the blood to the skin and thus relieving the inflamed parts within; they should be rubbed on the chest, both back and front, until the skin is well reddened. Inhalations give great relief. In the early stage, when there is little expectoration, plain steam is useful, or a teaspoonful of compound tincture of benzoin may be added to the hot water. Later, to assist in the expectoration of the phlegm, it is better to use oil of Scotch pine or pure terebene (Pr. 80), or creasote (*see* chapter on Drugs and Prescriptions). A jug is the most convenient form of inhaler, and each inhalation should last for from five to ten minutes. Another useful form of treatment is the bronchitis kettle, which both warms and moistens the air of the room, and almost acts like an inhalation. It must be so arranged on the fire that its spout conducts the steam well into the room and as near the patient as is convenient. A little eucalyptus oil added occasionally to the water conduces to its usefulness. The effect of steam in bronchitis is to soften and loosen the phlegm and render it more easy to expectorate.

The food should be light and nutritious, and consist chiefly of fluids. If there is much fever, or the cough is troublesome, solid food is quite inadmissible. **Diet.** Plenty of beef-tea and milk and milk foods must be taken, and from 3 to 4 pints of fluid nourishment will be required in the twenty-four hours. The complaint is an exhausting one, and as much food should be taken as the digestion will permit; in this way the weakness of convalescence may be lessened. As far as possible the food should be taken at regular intervals, $\frac{1}{2}$ pint every three or four hours. Stimulants are not usually necessary, but if the attack is a bad one, and the patient weak or exhausted, they are advisable, and about four to six tablespoonfuls of good brandy in the twenty-four hours would be a suitable quantity; it can be given mixed with the milk, or with some effervescing water.

As convalescence begins the food must be increased in quantity and strengthened in quality, starting with a little boiled fish, some chicken or meat jelly, and going on to ordinary food gradually, mutton being the first meat to attempt.

In the early stages of bronchitis the following is a useful mixture, as it soothes the soreness of the chest, reduces the fever, and encourages expectoration :—

PRESCRIPTION 87

Wine of antimony	1½ drachms.
Wine of ipecacuanha	1 drachm.
Solution of acetate of ammonia	1½ ounces.
Sweet spirits of nitre	½ ounce.
Camphor water to 8 ounces.	

An eighth part to be taken every 3 hours.

As the discharge gets more plentiful and thicker this may be changed to a more stimulating mixture :—

PRESCRIPTION 88

Tincture of squills	80 drops.
Carbonate of ammonia	½ drachm.
Tincture of senega	5 drachms.
Syrup of tolu	½ ounce.
Spirits of chloroform	2 drachms.
Water to 8 ounces.	

An eighth part to be taken every 4 hours.

Finally, as the expectoration grows less, we may use this mixture :—

PRESCRIPTION 89

Paregoric elixir	2 drachms.
Oxymel of squills	½ ounce.
Syrup of tolu	½ ounce.
Water to 8 ounces.	

An eighth part to be taken every 4 hours.

It is well not to begin this sedative cough mixture too early, as by relieving the sensibility of the mucous membrane and easing the cough it may allow the phlegm to collect in the tubes. It is particularly useful in the later stages of the attack, when the cough may be troublesome and the expectoration small in amount. During the illness care must be taken to keep the bowels acting regularly; a dose of Hunyadi water will be all that is required.

During convalescence there will be need for some good tonic. Probably the bark and ammonia mixture (Pr. 98) will be the best to start on, and later half a teaspoonful of Easton's Syrup should be taken in water three times a day after meals.

It must never be forgotten that there are many serious complications which may arise during a sharp attack of bronchitis, and that these are difficult to recognise and treat successfully. It is always wise, therefore, in all but mild cases to call in a doctor.

**Complica-
tions.**

The special tendency of this complaint to return makes it of great importance to ensure a very thorough recovery from the first attack, and to adopt very careful precautionary measures for the future, and to keep the body in a good state of health. Nothing secures this end so well as a carefully carried out bath treatment. A daily cold shower or sponge bath is excellent, but it is hardly possible to start this at once after an attack. The patient should therefore begin with a daily warm bath, and as he improves in health, and the weather gets warmer, the temperature of the water may be lowered, passing through a stage of tepid baths to cold ones. Warm clothing should be worn, and it is advisable that the under-garment be of some absorbent material, such as wool, both for winter and summer; in this way the body will be protected from chills. The utmost care is necessary to avoid all exposure to cold, damp, or sudden changes of temperature, and to take great care when going out in east winds, fogs, or night air. If for any reason it is necessary to go out in such circumstances, the danger may be lessened by wearing some form of respirator to cover both nose and mouth, but, except in those who are specially delicate, this is hardly necessary, so long as the nose is used for respiration and the mouth kept closed. When the nose is obstructed from any cause a respirator becomes a real necessity. The danger of breathing cold and damp air is not always understood, but it is important to know that this is as fruitful a cause of bronchitis as exposure of the chest and body. Where circumstances permit, much benefit will be obtained by spending the winter in a warm, equable climate, either at home or abroad. One winter passed without a cold on the chest may be the means of complete recovery from the catarrhal tendency.

CHRONIC BRONCHITIS

Is often the result of an acute attack which has been imperfectly cured, or it may be left after repeated attacks. It is the cause of the winter

cough of elderly people, and is then a regular visitor every year. Some persons never fail to have a cough every winter, which troubles them

Causes. more or less through the whole of the cold season, and only leaves them when the summer is well established.

The disease commonly affects those whose occupations expose them to all weathers, and is one of the commonest reasons for the poor seeking admission to hospitals. The costermonger, the street singer, and the laundress can hardly remain free from this complaint, owing to the risks and exposure of their daily avocations.

The previous history, then, is that the patient has had many attacks of bronchitis, and for years has had a cough in the winter, which begins about October and, unless he is very lucky, does not leave him until May.

Directly the cold weather sets in he catches cold, and the cough begins. It is very violent, comes on in frequent paroxysms, and shakes

Symptoms. him to pieces. The attacks are brought on by the slightest exertion—by speaking, by breathing cold air, or even by

moving from one room to another. The cough is often particularly troublesome when going to bed, probably because the bedroom is colder than the sitting-room, and when getting up in the morning, because phlegm has collected in the bronchial tubes during the night, and must be cleared out before the cough will cease.

The expectoration is usually very free, and varies in character considerably, sometimes being thick and yellow and very difficult to expel, or transparent and watery, and occasionally tinged with blood. Besides the cough there is usually some shortness of breath, which is brought on by slight exertion, such as going upstairs or even walking. It is bad at night, makes it almost impossible to go to sleep when lying flat, and is only relieved when the sufferer is propped up in bed with pillows or is sitting up in a chair. Both cough and breathlessness are much increased by fogs, east wind, and damp.

The general health is naturally much affected. The patient grows thin and weak, his heart fails, his circulation becomes sluggish, his legs swell, and his complexion is dusky. All his symptoms improve in the summer, but each winter he loses more ground, which finally cannot be recovered, and he becomes a chronic invalid. Various complications ensue; the chest becomes barrel-shaped and enlarged from emphysema, a disease of the lungs in which the air-cells are destroyed and the elasticity of the lung substance is lost through the force exerted during the violent cough; the heart becomes weak and

dilated, and occasionally a chronic inflammation of the lungs sets in, which may prove fatal.

The treatment of chronic bronchitis must be directed to relief rather than cure. The disease, when it has reached at all an advanced stage, is really incurable, and it then becomes necessary to relieve **Treatment.** as much as possible the various symptoms as they arise, and to preserve the general health by careful hygiene and suitable surroundings. The preventive measures advised for acute bronchitis are all of even greater importance in the chronic form, and every means must be taken to maintain the strength and avoid catching cold. After a time it becomes almost impossible for the chronic bronchitic to venture out at all in the English winter; he must shut himself up as soon as cold sets in, and remain a prisoner to the house until the warm weather returns. The only way to avoid this privation is to winter in a warm and equable climate. In this country such places as Torquay, Bournemouth, and Falmouth may be chosen; and abroad, Mentone, San Remo, Corfu, and Madeira. When the expectoration is profuse a dry climate is best, with a stimulating air; when it is scanty a moist, warm, soft, and relaxing air should be chosen. Pine woods in the neighbourhood, sea air, and shelter from mountains are all useful auxiliaries. Everything should be done to assist the digestion and encourage the appetite. A certain amount of exercise out of doors, when the climate permits, or of massage when confinement to the house is a necessity, will help in this direction. The food must be good, nourishing, and taken in as large quantities as possible. Stimulants in moderation are usually required. Fatty foods are useful; among them cod-liver oil must be included. Tonics are required, such as iron and quinine (Pr. 77), acid and gentian, bark and ammonia (Pr. 98), and the various malt preparations—malt and cod-liver oil being of special value.

For the various symptoms external and internal measures may be employed. Counter-irritation by stimulating liniments often eases cough and reduces expectoration. The turpentine and acetic acid liniment, the turpentine liniment with a teaspoonful of tincture of iodine to each ounce, and the compound camphor liniment are all useful; they should be rubbed on thoroughly, back and front, night and morning, and continued daily for a long time.

Drugs often prove of much value when employed by inhalation. In some cases ipecacuanha wine is found very useful; it is mixed with twice as much water in a spray apparatus. The spray should be drawn

well into the chest with a deep breath. At first this measure must be employed with care, only a few breaths being taken at each sitting, but as the patient grows accustomed to the drug it may be taken with greater freedom. Creasote, pinol, terebene, and compound tincture of benzoin may be used in hot water (*see* Drugs and Prescriptions), the steam being inhaled; or they may be mixed with liquid paraffin (a valuable form of which is known as paroleine), and then inhaled in the form of a cloud. For this purpose a special apparatus is required, called an atomiser or nebuliser. Chloride of ammonium is also used in a special form of inhaler, and consists of white, unirritating fumes. For further particulars about inhalers reference must be made to the description of the apparatus in a later chapter.

The special medicines which may be employed for chronic bronchitis are the balsams and iodide of potash, especially the latter, of which 3 grains may be taken three times a day, either in tablets dissolved in water, or combined with the bark and ammonia tonic (Pr. 76).

EXPECTORATION

Whilst discussing "cough" we frequently had to refer to expectoration. The word means "out of the chest," and usually corresponds with "phlegm," but includes also all matters spat up, whether from the throat, windpipe, bronchial tubes, or lungs.

The technical term for that which is expectorated is sputum (plural, sputa), which may consist of many substances besides mucus. Pus is very commonly mixed with mucus, and blood occurs occasionally. A variety of extraneous material also may be expectorated which has accidentally been drawn into the air passages in respiration, such as dust or soot. In former times much information was supposed to be obtained from the sputum concerning the nature of the disease. The doctors of those days concluded that a patient had consumption if they found pus in it, and they must in this way have been led into many mistakes. Now that we make use of other and newer means of examining the chest, such as percussion and auscultation—to be described in a later chapter—we depend less upon an examination of the sputum, but much information can still be obtained by careful observation of it.

In health there is really nothing to be expectorated, for though the mucous membrane is always secreting a certain amount of clear, sticky fluid, which is constantly being moved upwards towards the mouth by the ciliary action of its surface cells, yet the continuous movement

of air over it causes sufficient evaporation to prevent its accumulation; but if the surface becomes inflamed the secretion increases in amount, and has to be expectorated.

In bronchitis the early stages of an attack are accompanied by a glairy, sticky fluid filled with air-bubbles, like frothy white of egg, whilst in the later stages it is thicker, opaque, and yellowish white. The former sputum, therefore, shows an acute inflammation of the mucous membrane, or a catarrh, whilst the latter shows that this is subsiding. If the lung is inflamed (pneumonia), blood is mixed with the expectoration. If the blood is in large quantity the sputum is bright red, or sometimes prune-juice coloured; if in small quantity and thoroughly mixed with the mucus it is "rust-coloured," the latter being the usual and typical appearance of the expectoration of pneumonia. It is also peculiarly thick and sticky, and is only brought up with much difficulty and violent coughing. This variety of sputum, once seen, is not easily forgotten, and is almost enough to prove the presence of pneumonia. In pleurisy, despite constant cough and much pain in the side, only a little frothy saliva is brought up, which is unlike the expectoration of either bronchitis or pneumonia. Pus in small quantities is spat up in bronchitis, and is mixed with mucus; if it occurs in large quantities there is more likely to be consumption, and if it comes in a gush, followed by more, it is almost certainly the result of an abscess breaking into the air passages.

There is a peculiar condition seen in the expectoration of consumptive patients, consisting in the presence of a number of whitish spots, which give the sputum a pearly appearance. If these are examined under the microscope they are found to consist of little bits of lung tissue; they show, therefore, that the lung is being gradually destroyed, and that a hole or cavity is forming in it. If these pieces of lung tissue are properly stained and examined under the microscope the tubercle bacilli will be found in them. Enough has been said to show that unskilled persons can learn much from observation of the expectoration, and form a fair opinion as to what complaint is present.

As expectoration can only be looked upon as a symptom of many different affections, it is hardly possible to describe its treatment apart from that of its cause. We must therefore refer our reader to the affections that have been mentioned, and to the section on Cough (p. 253). The medicinal substances which are used to act upon the mucous membrane of the air passages and alter the quantity and character of its secretion are called expectoratives.

ASTHMA

This disease is described here in company with other affections of the organs of respiration because its symptoms closely connect it with them, but in many cases it is really a disorder of the nervous system, which shows itself by its action on the bronchial tubes.

Asthma is liable to run in families; it is also distinctly hereditary, asthmatic parents begetting children with a predisposition to the complaint. But it occurs, too, in many people in whom there is no evidence whatever of inheritance, and the causes of this acquired form are legion, and we can only attempt to give a general outline of them.

Causes. It affects both sexes, but is twice as common in men as in women. It occurs at all ages, but the first attack most commonly comes on in childhood, and not unfrequently the complaint sticks to the individual for years, the attacks recurring in spite of treatment; but those cases that begin early in life are often outgrown when maturity is reached. It is impossible to tell beforehand what will bring on an attack in any particular case, but a person who has suffered for some time can generally do so as regards himself from previous unpleasant experiences. There are two distinct divisions into which the causes can be grouped, the first being the various forms of irritation which act directly on the mucous membrane of the bronchial tubes, and the second those that act indirectly through the blood and nervous system.

Almost any form of irritation of the bronchial mucous membrane may excite asthma in those who are predisposed. Common dust, woollen fluff, the pollen of grasses and plants, and any light floating particles in the air may be sufficient. Certain odours act similarly, such as the smell of ipecacuanha, of new-mown hay, of pitch, of phosphorus fumes, or even the peculiar smell of some animals, as dogs, cats, or horses. Another frequent cause is locality or climate; it is almost useless to prophesy what variety of weather or climate will not bring on an attack in some people: great heat or great cold, extreme dryness or dampness, may all produce it, but particularly dampness and closeness of the air. It is a curious thing that the very slightest change of locality may set up an attack, or may remove one when it exists. Some people can live on one side of a street and not on the other, at the back of a house and not at the front; some are free from the trouble in inland air, others at the seaside; some in elevated and others in low-lying localities; some in a smoky town, which they find

suits them better than even pure mountain air. Of all causes probably bronchitis is the commonest, whether it be the result of cold or a complication of other diseases, such as whooping-cough or measles. In a great number of cases of asthma in later life the starting-point can be traced to bronchial affection in childhood.

Of the second class of cases, which act through the nervous system, many are purely emotional in origin, the cause being excitement, anger, or fright. Others act indirectly through the nerves, and are affections of other organs of the body. Indigestion, flatulence, and acidity, especially when they occur as the result of over-indulgence at supper or late dinner, are common exciting causes.

Gout is a very frequent cause and concomitant of asthma. It may alternate in its effects between asthma and a gouty joint. There is a very close connection between several conditions which are manifestations of the gouty constitution. Asthma, hay fever, eczema, and nettle-rash are all at times due to gout; they may occur in different members of the same family, or in the same member at different times. An attack of eczema or nettle-rash may subside only to give place to an attack of asthma, and may reappear as the asthma passes off. Some affection of the nose or larynx may be the origin of an attack—some sensitive spot in the nasal passages which is irritated by the inhalation of solid particles or noxious emanations.

These are perhaps sufficient examples of the strange vagaries of this complaint.

The symptoms of asthma come on in paroxysms at indefinite periods. The patient goes to bed feeling perfectly well, and sleeps comfortably for several hours; then, early in the morning, **Symptoms.** he wakes up with a feeling of oppression and discomfort; his breathing is difficult and noisy. He falls again into a troubled sleep, only to wake still more oppressed. He again dozes, but can sleep no longer, for all his energies are required to struggle with his breathing. He sits up in bed, or is forced to get up, and he places himself in the position he has discovered by previous experience to be most helpful, and brings into play all the muscles of his body that can in any way help his respiratory efforts. His breathing is noisy and whistling, and is accompanied with a loud humming sound. The air is drawn into his chest with the greatest difficulty; he cannot speak or move; his face gets pale, anxious, and covered with sweat; he grows dusky or even blue in the face. The condition is one to excite alarm, but probably is worse to look upon than to endure. However extreme

may be the difficulty of respiration, it never ends fatally during the attack, for after a longer or shorter period of struggle the symptoms gradually abate, and the sufferer recovers his usual health. The attack may vary in duration from half an hour to several days, and usually ends by the expectoration of a certain amount of mucus, which seems to give relief, and the patient can then eat, sleep, and go about as usual.

The expectoration in asthma is peculiar, for it consists of semi-transparent masses, like little balls of jelly, during the first two or three days of the attack, and in the later stages of ordinary phlegm.

These attacks occur at irregular intervals, and after a time leave their mark upon the sufferer's frame. He grows wasted and anæmic, develops a severe stoop and the barrel-shaped chest of emphysema (p. 289).

The immediate cause of all this trouble is usually a spasmodic contraction of the small muscular fibres of the bronchial tubes, by which the size of the air passage is diminished. Another variety of asthma, probably that of gouty origin, is caused by a sudden swelling of the mucous membrane lining the tubes, very similar to the sudden swelling of the skin which occurs in nettle-rash. It is only when the swelling or spasm passes off that the patient is able to breathe again with freedom.

In the treatment of this condition prevention is of great importance, but it is only the patient who can tell, by bitter experience, what it is necessary for him to avoid. He finds that sleeping in certain places or particular climates, or inhaling certain smells, or indulging in certain articles of diet, will bring on an attack, and he must avoid the cause, whatever it be. As dyspepsia is one of the common causes, the diet must be carefully managed. The best meal should be taken in the middle of the day, and only a light one in the evening. The general health must be maintained by good habits, by healthy exercise, fresh air, cold bathing, freedom from worry, and careful avoidance of all the risks likely to lead to an attack of bronchitis.

No particular climate can be recommended, but the patient must choose that which experience has shown suits him best. If one place disagrees with him he must try a change of air, always remembering that it is not necessarily the theoretically healthy climate that will give him relief.

The difficulty of curing asthma is shown by the enormous number of drugs and other measures which have been extolled as certain asthma cures. But the drug which will cure one case may be useless in another,

and even that which relieves one attack may fail in another in the same individual. In gouty persons probably nothing will do so much good as a visit to some such health resort as Homburg, Aix-les-Bains, or Harrogate, and a thorough course of the waters. Arsenic, alkalis, and iodide of potash will also give relief, the following mixture being an example :—

PRESCRIPTION 90

Solution of arsenic	24 drops.
Iodide of potash	24 grains.
Bicarbonate of potash	2 drachms.
Chloroform water to 8 ounces.	

An eighth part to be taken 3 or 4 times daily, after meals.

To relieve the spasm a class of drugs called anti-spasmodics is employed, and one of the following mixtures may be found useful :—

PRESCRIPTION 91

Ethereal tincture of lobelia	2 drachms.
Spirits of ether	2½ drachms.
Compound tincture of chloroform	40 drops.
Camphor water to 8 ounces.	

An eighth part to be taken every 2 or 3 hours during an attack.

PRESCRIPTION 92

Iodide of ammonia	1 drachm.
Fluid extract of grindelia robusta	15 drops.
Tincture of lobelia	40 drops.
Tincture of belladonna	½ drachm.
Syrup of Virginia prune	1 ounce.
Water to 8 ounces.	

An eighth part to be taken every 3 or 4 hours.

PRESCRIPTION 93

Hydrate of chloral	1 drachm.
Iodide of potash	40 grains.
Syrup of orange	½ ounce.
Water to 8 ounces.	

An eighth part to be taken every 3 or 4 hours.

In many cases the application of drugs directly to the mucous membrane is found very useful, and this can be carried out by employing smokes, sprays, or clouds containing the drugs. A very useful smoke

which is both cheap and made easily at home, is that of nitre paper. It is prepared by dipping a piece of fairly thick ordinary blotting-paper in water in which nitre (nitrate of potash) has been dissolved, and drying it. There is no difficulty in making the solution, as it requires as much nitre as the water will dissolve. These papers are sometimes made stronger and more efficacious by adding some chlorate of potash to the solution. They are soaked in boiling water to which has been added equal parts of the nitre and chlorate of potash in as large quantities as the water will dissolve, and using much thicker blotting-paper. The papers will keep for any length of time, and will not lose their virtue.

The best time to use these "touch papers" is when going to bed; they then fill the air of the bedroom with a sedative smoke, and often provide a comfortable night for an asthmatic person threatened with an attack. The way to use them is to fold the paper across the middle and stand it up on a metal plate, the cover of a tin box, or the fender, and light it at its upper corners. The milder papers gradually smoulder; the stronger burn more quickly, and give off, in doing so, thick fumes of smoke, which fill the air of the room and cause a feeling of drowsiness when inhaled.

Many other smokes are produced by burning the dried and powdered leaves of plants, those most frequently used belonging to the order *Atropaceæ*, such as belladonna, *Datura stramonium*, or *D. tatula*, the two latter being generally included in asthma powders. The leaves are powdered up, mixed with a small quantity of nitre to make them burn, and a teaspoonful is placed on a plate and set alight. A powder used at the Brompton Hospital consists of:—

PRESCRIPTION 94

Anise	2 drachms.
Nitre	2 drachms.
Stramonium leaves	$\frac{1}{2}$ ounce.
Tobacco	5 grains.

A teaspoonful to be burned on a plate and the fumes inhaled.

Tobacco often succeeds in warding off attacks, and can be used in a pipe, cigar, or cigarette, but for preference a pipe. Mild tobacco is quite efficacious, and is less likely to produce sickness, but in confirmed smokers the stronger tobaccos may be required. For women and children a few whiffs of a mild cigarette will be all that is necessary.

Stramonium, or thorn apple, may also be smoked in a pipe.

Various asthma cigarettes can be recommended—for instance, Cigares de Joy, cubeb cigarettes, and arsenical cigarettes.

When using smokes for asthma it is well to inhale the smoke well into the lungs, and not simply to draw it into the mouth and puff it out again. If whilst using stramonium the throat gets very dry or the pupils dilated, it is an indication that the remedy should be discontinued for a time.

Besides these remedies we may mention certain asthma "cures," all of which have their particular advocates amongst asthmatic patients—namely, Himrod's Cure, Bliss's Cure, and the Green Mountain Cure; and we may complete our lists of preparations which are employed as "smokes" by adding the following:—Dissolve $\frac{1}{2}$ ounce of nitre in $\frac{1}{2}$ ounce of boiling water; add $\frac{1}{2}$ ounce each of lobelia, stramonium leaves, and black tea, all well powdered. Mix well together, dry, and add 1 drop of oil of anise. Half a teaspoonful or more to be burnt on a plate, and the fumes inhaled six or eight times a day, and the bedroom fumigated with the same.

Most of the preparations that are inhaled as smoke act better if they are taken early in an attack or as a preventive, rather than when the asthma has become well established. This may partly be explained by the great difficulty the patient has, when the asthma is bad, in inhaling anything at all. The difficulty of breathing prevents the smoke from being drawn at all deeply into the chest and being brought in contact with the part where it can act with benefit.

Coffee is an excellent remedy, and should certainly be tried by every asthmatic. It should be taken just as we like our *café noir* after dinner—hot, strong, and in small quantity.

A few drops of chloroform inhaled from a handkerchief will often be found to give great relief to the spasm. This remedy must, however, be taken with great caution, and never without another person being present, unless the capsules mentioned later on are used, for serious accidents, and even death, have been caused by the production of unconsciousness. It is never necessary to give enough chloroform to bring on unconsciousness, relief being obtained, if at all, long before this is induced. If the drug is used without another person being present, unconsciousness may be unintentionally produced, and the patient may fall and injure himself, or may continue to inhale the vapour until his life is placed in great danger. Glass capsules encased in cotton-wool and silk may be bought, containing 10, 20, or 30 drops of chloroform in each. The capsule is broken in the handkerchief,

and the vapour inhaled without danger of an overdose. Gelatine capsules are also made, but the chloroform is more likely to volatilise from them. Glass capsules containing 5 drops of ethyl iodide with 10 drops of chloroform are also usefully employed in the same way, and also a drug called amyl nitrite, 2 or 3 drops in a capsule; but this last-mentioned drug is very powerful, and should not be employed without first asking a doctor if there is any reason why it should not be used.

Another drug which should be indulged in with caution is alcohol. A small quantity of brandy, whisky, or gin with a little very hot water may check an attack. In those cases of asthma which are so severe that the patient finds it difficult either to swallow or inhale, it may be necessary to administer drugs by injections under the skin, and morphia or atropia may be used, but this form of treatment must only be carried out under a doctor's supervision. Sometimes relief is obtained by plunging the hands or feet into hot water, or by holding the breath as long as possible and then taking a gentle inspiration.

In those attacks which are brought on by irritation of the mucous membrane of the nose, a spray of cocaine of the strength of 2 per cent. may be employed, and if it proves useful and relieves the attack it indicates that a permanent cure may be hoped for by cauterising the sensitive part. Some physicians treat their patients in what is called the pneumatic chamber, in which the air is highly compressed, and much benefit is sometimes derived from this measure.

To sum up: In order to check a threatened attack of asthma we must first try to discover the cause. If it is constipation, take a good purge, or clear the bowel with a soap-and-water injection. If the stomach is irritated or overloaded by the last meal, take an emetic: a tablespoonful of ipecacuanha wine, or some mustard and water, followed by a couple of tumblerfuls of warm water. If it is something in your surroundings, have it removed at once, or, if that is impossible, remove yourself—go to some place that suits you. If, however, an attack is inevitable, place yourself in as comfortable a position as possible—sitting up in an easy chair with a table to rest on is probably as good as any—and have some remedies by you. If you have had many attacks, try first the remedy which you know gives you most relief, and which, if you are wise, you will have ready at hand. Take a cup of hot black coffee and have a smoke, and follow these with a dose of one of the anti-spasmodic mixtures, or break a vaporole of chloroform and inhale it.

SHORTNESS OF BREATH

So long as the ordinary rate and depth of breathing are sufficient to supply the necessary amount of oxygen to the body no difficulty arises, and respiration is carried on at its natural rate. If this rate is increased without any correspondingly increased need, oxygen accumulates in the body, and it is possible to diminish the depth or rapidity of the movements, and even arrest them altogether for a time, without any ill effects. This condition, which is called apnœa, can be produced artificially by the inhalation of oxygen gas. When, on the other hand, there is an insufficient amount of oxygen, whether due to a diminished supply or an increased demand, shortness of breath is produced, and this necessitates more rapid and deeper breathing. Difficulty of breathing, or dyspnœa, as it is called, may grow worse, and then may become serious and threaten life from suffocation (asphyxia).

Shortness of breath and its consequent more violent movements of respiration may, therefore, occur without the presence of disease, and is then Nature's method of supplying the body with an increased amount of oxygen. We all know that we get out of breath with active exercise, simply because exercise increases the chemical changes which take place in the body and the amount of carbonic acid that is formed, and oxygen is therefore necessary to supply fresh food for the tissues. The breathing being under the control of the nervous system, nervousness often causes breathlessness, the sensations of fear and excitement increasing the rapidity of the breathing.

In dyspnœa the breathing may be altered in either rapidity or depth, in both ways more oxygen being drawn into the lungs.

A greater demand for oxygen is produced by the presence of fever, and therefore all affections of a feverish nature are accompanied with increased rapidity and depth of respiration. All complaints which interfere with the entrance of oxygen, such as bronchitis or pneumonia, are accompanied with difficulty of breathing. But the disease in which respiration is most difficult and most laboured is asthma, in which, owing to muscular spasm of the walls of the bronchial tubes, hardly any air can reach the lungs. In this complaint the trouble occurs in fits or paroxysms, comparative comfort being enjoyed in the intervals.

In many complaints in which breathing is painful another form of difficulty of breathing is shown, for in these the air is free to pass

along the air passages, but the movements of respiration are so painful that the patient uses every means in his power to restrain them. In pleurisy, for instance, the slightest attempt to take a breath produces a sharp stabbing pain or stitch in the side, and in peritonitis any movement of the diaphragm or the walls of the abdomen causes acute suffering. The result is that every breath is short, shallow, and gasping, and respiration is carried out more frequently than is natural.

One of the most serious and most violent forms of dyspnœa is that produced by obstruction of the air passages by a foreign body. Immediately it enters a violent spasmodic cough is set up, the patient gasps and struggles, drawing in the air with long, deep breaths, and driving it out again with all the force at his command. Curiously, the difficulty of breathing is apt to pass off for a time and return again in attacks of greater violence. Other forms of obstruction cause some of the most anxious cases of difficulty of breathing with which we have to deal. These occur in diseases of the throat and windpipe, in which inflammation and its accompanying swelling may block the air passages, a danger always possible when the disease involves the tongue, tonsils, larynx, or windpipe, and of particular gravity when it takes the form of diphtheria.

Shortness of breath may be caused by certain conditions of the blood when this fluid is diminished in quantity, as after a sudden or free hæmorrhage, or is wanting in its oxygen-carrying matter, as in anæmia. In the latter the sufferer may feel perfectly comfortable when at rest, and yet after making some effort, which ordinarily would cause no difficulty, such as walking rather quickly, going upstairs, singing, or coughing, a distinct difficulty of breathing, or breathlessness, is felt. In certain severe diseases, especially heart affections, a peculiar form of dyspnœa occurs, which comes on directly the patient lies down. He feels all right, and can breathe fairly easily if he is propped up with pillows, but immediately he assumes the recumbent position his breathing becomes oppressed. Sometimes this trouble persists for long periods, and persons may have to forsake their beds and sit up in an easy chair for many months at a time.

There are certain mechanical conditions produced by disease which make breathing difficult. In rickets, on account of muscular weakness and the loss of elasticity of the chest walls, much trouble is produced by very slight causes; and in emphysema, a disease of the lungs very common in old age, a peculiar form of dyspnœa occurs, the difficulty being especially felt during expiration.

We are all occasionally familiar with the breathlessness of indigestion, the feeling of fulness and inability to breathe properly after a meal from distension caused by flatulence.

There is also a peculiar form of unnatural breathing which occurs in some nervous diseases, and which we may just mention here. It is called "Cheyne-Stokes respiration," and is characterised by the breathing at intervals becoming by degrees more and more rapid and deep up to a certain point and then subsiding in the same gradual manner. This is then followed by an interval during which there is a complete cessation of respiration. This symptom is of serious import.

In ordinary respiration scarcely any movement or sign of the act is observable to an onlooker, the actual quantity of air changed with each breath being very small, and it is possible voluntarily to breathe more or less deeply, but when dyspnœa occurs extraordinary efforts are necessary, and many muscles not usually employed are brought into use, especially those which move the upper part of the chest; the nostrils are opened and closed with each breath, the colour of the face grows dusky and bluish, and the breathing becomes noisy. In some cases the sound is a sort of snoring noise, called stertor, and is produced in the throat. When the difficulty is due to constriction of the bronchial tubes the noise produced has a whistling sound, and if due to the blocking of the tubes with mucus it is of a gurgling character.

Shortness of breath is therefore due to many different conditions, and treatment must be directed to the removal of the cause—by relieving the obstruction, as in laryngitis; by improving the condition of the blood, as in anæmia, or by relief of the pain, as in pleurisy. Sedative inhalations, hot poultices and fomentations are all useful in the inflammatory conditions, and the inhalation of oxygen gas will be found to give relief in those cases in which blueness of the blood is very marked. In extreme cases it may be necessary to open the windpipe by the operation called tracheotomy.

INFLAMMATION OF THE LUNGS

Pneumonia is an affection of the true lung tissue, as distinct from the bronchial tubes and the pleura. As a rule one lung only is involved, and it is its lower part or base which is most commonly affected. Both lungs are, however, sometimes inflamed, either together or in succession, and we then speak of the illness as "double pneumonia."

The disease may begin in various ways. It may come on suddenly without warning or previous ill-health, the lung alone being affected, and it then forms the typical variety of inflammation of the lungs, or acute lobar pneumonia. Or the disease may be secondary to an attack of bronchitis, when it is called broncho-pneumonia, or lobular pneumonia. In such a case the inflammation gradually spreads from the large bronchial tubes to the smaller ones, causing "capillary bronchitis," and from these to the air-cells. The cells become blocked up with mucous secretion, until large portions of the lung are rendered airless and useless for respiration. In other cases the pleura and lung are inflamed together, pleurisy complicating the pneumonia, and the name of pleuro-pneumonia is then given to the condition. Pleurisy may also come on later in an attack of pneumonia, the inflammation spreading outwards from the lung.

When the lungs are acutely inflamed a large quantity of thick fluid is poured into the air-cells, which become filled up and airless, and the lung is then said to be "solid." By various means a physician is able to recognise that the lung is solid and thus diagnose the disease, but these means are not at the disposal of an unprofessional person; they are described elsewhere as percussion and auscultation. The symptoms, which we shall set out presently, are, however, sufficiently characteristic, in most cases, for all to be able to recognise this disease.

Pneumonia is one of the long list of complaints due to exposure to cold and wet, and is one of the most serious of them. It occurs in all parts of the world, but with especial frequency where the climate is cold, damp, and changeable. In this country it is most prevalent during the months of April and May. It affects all classes and all ages, but particularly those whose lives are spent in the open air, and who are thus more exposed to climatic changes. It is more prevalent in towns than in rural districts, and claims as its most frequent victims the overworked, debilitated, and delicate; it is, however, a complaint often met with in robust and healthy persons. The abuse of alcohol is a powerful predisposing cause.

There is no doubt that many cases of pneumonia are infectious in nature, and a special germ, called a pneumococcus, has been discovered which is credited with the power of producing and disseminating it. The fever and other symptoms are due to the poisons it engenders.

Pneumonia may complicate other diseases besides bronchitis and pleurisy. It occurs often in cases of heart disease, in Bright's disease, and in many other conditions which cause extreme exhaustion. Our

description will here refer to a case of true pneumonia, and afterwards we will deal with broncho-pneumonia.

For two or three days after catching cold the patient experiences a feeling of general malaise, with some slight rise of temperature and restlessness. He feels out of health and miserable, loses

Symptoms. his appetite, and has headache and pains about his body. These symptoms may be so slight as hardly to attract attention at the time, and are only remembered when the more serious ones make their appearance. The onset of pneumonia usually, therefore, seems sudden. The patient is attacked with a violent shivering fit; he trembles all over, his teeth chatter, and he feels exceedingly alarmed at the evidently serious state he is in. There is found to be a high degree of fever, the temperature being perhaps 104° or 105° . The pulse is rapid—100 to 120 beats a minute; the respirations are frequent, perhaps two or three times as frequent as normal; the skin is hot and dry; the cheeks are flushed, the head aches, the tongue is dry, there is great thirst, the appetite fails, and vomiting often comes on. We have now an evidently serious condition of things, but all these symptoms may occur in other highly feverish diseases, and our desire is, of course, to find something distinctive about them to guide us as to what part of the body is involved. The one symptom which will help us in this case is the relation of the beats of the heart to the movements of breathing. In health there are about four beats to every respiration, but when the respiratory organs are affected by disease this relation is much altered; the respirations are increased much more than the heart-beats, and this is particularly marked in pneumonia. If, therefore, an acute illness comes on with a rigor and high fever, and at the same time the respirations are increased more markedly than the pulse-rate—for instance, respiration being from 50 to 60, and the pulse only from 100 to 110—we should immediately suspect some disease of the respiratory organs, and more particularly pneumonia.

The other symptoms confirm this suspicion. There is usually some pain in the side, more marked if pleurisy is present, and the pain is increased by coughing. The breathing is not only rapid, but is short, shallow, restrained, and carried on with much difficulty. There is a short hacking cough, which at the outset is dry, but in a little time is accompanied with expectoration. This expectoration is a very characteristic symptom; it is transparent and jelly-like, and exceedingly sticky. At first it is clear, but very soon becomes coloured with blood, getting tawny, then reddish or rust-coloured. Occasionally it looks

like plum-juice from being mixed with dark-coloured blood; at other times it is pale yellow or saffron-coloured. But the rust colour is commonest, and constitutes one of the most certain indications of the presence of pneumonia.

The temperature in this disease runs a peculiar course. We have already seen that at the very beginning of the attack with the initial shivering fit it rises very high, and it remains at this height for from four to ten days, with slight intermissions in the morning, the evening temperature being always higher than the morning. Then one day a sudden fall occurs, and the temperature runs down to normal, or even below it. This rapid fall corresponds with what is called the crisis, and is a peculiar feature of pneumonia. The patient seems very ill and in a most critical condition, with high fever, rapid breathing, and quick pulse, when suddenly, without any warning or definite cause, a wonderful change occurs: the temperature falls, the breathing improves, the pulse becomes less rapid, and the patient's condition shows a general improvement. This crisis is believed to result from the formation in the body of an antitoxin, and is known to be a common termination of pneumonia. The patient's friends often know this also, and are perpetually asking when the crisis is coming, or what day it will occur. It is impossible to answer these questions quite definitely. The crisis may occur on any day of the illness or may never occur at all, but it usually takes place on the fifth, sixth, or seventh day from the first onset or rigor, and in all probability in the late afternoon. At the height of the disease the patient is likely to wander in his mind and be delirious, especially in the evening or during the night, but this is not a serious matter.

This account of the symptoms ought to be sufficient to enable us to recognise pneumonia, and to realise how serious a complaint it is, and how important is a doctor's assistance in its management.

When the crisis occurs all the symptoms abate. The fever may rise and fall, but never re-ascends to its original height; the cough gradually grows less, the pain disappears, the expectoration ceases, and the patient gradually passes on to a state of convalescence without complication. In many cases, however, the recovery is very slow. No definite crisis occurs; the temperature only returns to the normal after many days of rises and falls. But even in these cases the ultimate recovery may be satisfactory and complete. On the other hand, complications may occur. The other lung may become inflamed, and all the symptoms be

**Course of
the Disease.**

increased or return—a serious matter, but not by any means hopeless, for, even so, many patients make a good recovery. However, in the very young or the old and feeble, and sometimes in healthy adults, the strength is insufficient to meet so great an emergency; the heart grows weak, the pulse feeble, rapid, and irregular; the lung is so seriously damaged that insufficient oxygen is obtained; the patient becomes blue and exhausted, and a fatal issue ends the case. In some instances matter is formed in the lung, and produces an abscess, or gangrene sets in and destroys the lung, or the inflammation clears up imperfectly, and chronic disease of the lung is left, which may end in the development of consumption. In such cases nursing is of the utmost importance, and, whenever possible, the services of a well-trained nurse should be obtained to carry out the doctor's directions.

The patient should at once be put to bed, clothed in some woollen garment and preferably between blankets. The room should be as large and airy as possible, the fire should be lighted, and the temperature maintained at about 60°; it is not necessary to keep it quite so high as for a case of bronchitis. Fresh air is most important, and the room must be well ventilated. The window should be kept open, and draught avoided by arranging a screen so as to protect the patient. He must be kept absolutely quiet and still, must not be allowed to sit up in bed nor to talk, and getting out of bed for any purpose must not be considered for a moment. The chest must be covered up with a jacket made of Gamgee tissue. Hot linseed poultices give relief to pain and cough, and should be applied at regular intervals of four hours; they should be kept on for two hours and then taken off, and the chest quickly dried and covered up with the Gamgee until the next poultice is due.

Plenty of nourishment is necessary, but this must be only in fluid form, and must consist of milk and milk foods, beef-tea and meat extracts. About three pints of milk should be given in twenty-four hours—a good cupful every three or four hours; it is easier to digest if mixed with soda-water. It is of the utmost importance to keep the digestion in good order; the patient has to meet a great drain on his strength, and the only way to maintain it is to take plenty of simple, easily digested nourishment. The bowels must be kept regular with aperients, or the digestion will suffer. Alcohol is not usually needed in the early stages of the illness except in the delicate, but at the time of the crisis a good dose of brandy may be required, and an occasional egg-flip may be allowed, especially during convalescence. Thirst may

be relieved by milk and soda, barley-water, toast-water, Imperial drink, or home-made lemonade. Iced water or small pieces of ice to suck are harmless, and often grateful to the patient. Medicines are of quite secondary importance to good nursing, but various symptoms may require drug treatment as they arise. Some relief to the general feverish condition may be obtained by keeping the skin and kidneys acting by such a mixture as the following :—

PRESCRIPTION 95

Solution of acetate of ammonia	.	.	.	2 ounces.
Bicarbonate of potash	.	.	.	2 drachms.
Ipecacuanha wine	.	.	.	40 drops.
Chloroform water	to 8 ounces.			

An eighth part to be taken every 3 or 4 hours.

It is well not to attempt to stop the cough unless it is very persistent or painful, or keeps the patient from getting sufficient sleep. A certain amount of cough is necessary to remove the thick phlegm, and if it is checked suddenly this may collect in the small air-tubes of the affected lung and cause trouble. The best medicine to give, if it is found necessary, would be paregoric elixir, 15 to 20 drops of which may be added to each dose of the above medicine.

Sometimes the breathing becomes much impeded, and, in spite of the violent and rapid breaths the patient may take, the blood grows more and more impure from insufficient supply of oxygen, and the face becomes dusky and blue. This is a serious condition, and requires energetic treatment; the *nux vomica* and *digitalis* mixture (Pr. 97) should be given at intervals of three hours, and a cylinder of oxygen should be obtained and the patient made to breathe the gas for a few minutes at a time and frequently.

For high fever it may be necessary to give some special medicine, and probably a dose of this quinine mixture would be the safest :—

PRESCRIPTION 96

Sulphate of quinine	.	.	.	16 grains.
Solution of strychnia	.	.	.	24 drops.
Dilute hydrobromic acid	.	.	.	1½ drachms.
Tincture of orange peel	.	.	.	3 drachms.
Chloroform water	to 8 ounces;			

An eighth part to be taken as directed in the text.

This can be repeated every three or four hours and its effect on the temperature watched. But to reduce fever, if it is very high, nothing is

better than sponging the body over with tepid water. Great care must be taken to avoid chill, and one portion must be treated at a time. By this means also the symptom of sleeplessness may be relieved.

As the fever subsides, chief attention must be directed to encouraging the absorption of the solid material which fills the lung. The lower part of the chest on the affected side should be painted daily with tincture of iodine until the skin begins to feel sore and its surface grows scurfy. The following mixture, which helps to clear the lung and acts as a respiratory and heart tonic, may be used :—

PRESCRIPTION 97

Tincture of nux vomica	80 drops.
Tincture of digitalis.	1 drachm.
Sal volatile	$\frac{1}{2}$ ounce.
Chloroform water to 8 ounces.	

An eighth part to be taken 4 times a day.

About this time, too, the diet must be strengthened, a little alcohol given, and an egg-flip twice daily. As the symptoms gradually subside the patient may be allowed to get out of bed, but he must do this with care, for he is sure to be very weak, and fainting attacks are likely to come on. The first occasion must be but for a few minutes while the bed is being made comfortable, the time being gradually increased as the strength returns. With convalescence he must return to ordinary diet gradually, and the appetite and strength will be increased by the use of tonics, such as the following :—

PRESCRIPTION 98

BARK AND AMMONIA MIXTURE

Compound tincture of bark	$\frac{1}{2}$ ounce.
Carbonate of ammonia	24 grains.
Syrup of orange	$\frac{1}{2}$ ounce.
Water to 8 ounces.	

An eighth part to be taken 3 times a day before meals.

Or compound syrup of the hypophosphites can be recommended : half a teaspoonful with a tablespoonful of water to be taken three times a day after meals.

BRONCHO-PNEUMONIA

Is the form of pneumonia which comes on during an attack of bronchitis by the spread of the inflammation along the mucous membrane. It is also called catarrhal pneumonia, because its origin is catarrh of

the lining membrane. It is necessary for us to describe this condition separately from true pneumonia, because its onset is quite different, and its treatment varies in some important particulars.

Broncho-pneumonia is produced by all those conditions which we have described as the causes of bronchitis, and especially those which bring on great exhaustion, such as measles, whooping-cough, influenza, and diphtheria. It is a complication of bronchitis very likely to occur when the general system is reduced and exhausted, and it is to this fact that its special dangers are to be traced. In true pneumonia there is a severe active inflammation, often occurring in one who has power of reaction and recuperation, but in broncho-pneumonia there is a slowly progressive inflammation, spreading insidiously in a debilitated and exhausted organism. Knowing this, it is easy to understand that the onset of the disease is difficult to recognise.

The symptoms come on almost unobserved in the course of an ordinary attack of bronchitis, and the only definite evidence of its presence is that all the pre-existing symptoms become worse and the general state more serious. The well-marked rigor of pneumonia is absent, and there is no sudden rise of temperature or increase in the rate of pulse and respiration. The pulse, already quickened by bronchitis, grows somewhat quicker and weaker, the respiration rather more rapid and more difficult, the expectoration thicker and streaked with blood, the cough more troublesome. The temperature rises gradually, never reaching the height of true pneumonia; the illness runs no definite course, and is terminated by nothing like a crisis. The digestive organs are disturbed; vomiting is common, and is often accompanied with diarrhœa, either of which conditions may easily be brought on by indiscretions in diet or irritating medicines. The case is very liable to run a downward course. The breathing becomes more rapid and shallower, the cough is less vigorous, and the phlegm collects in the small bronchial tubes and air-cells. The difficulty of breathing becomes extreme; the face grows blue, and the hands and feet cold and swollen; the strength fails, and the patient passes into a state of semi-unconsciousness, and may die from sheer exhaustion and from suffocation due to the accumulated mucous discharge.

The disease is a dangerous one, and is particularly likely to end fatally in the very young, the old, and the debilitated, all of whom have insufficient strength to pass through so prolonged and exhausting

an illness. Fortunately, many cases recover, though after a long illness, and the convalescence is prolonged and tedious.

The treatment must differ from that of pneumonia in being more active, stimulating, and sustaining. In the latter disease a great deal can be left to the recuperative power of the system, but in this the system is weakened, the power of reaction is to a great extent lost, and the tendency is for things to go from bad to worse.

The patient must be treated as we have recommended for bronchitis (p. 261). The bedroom must be well ventilated and kept fresh, but it is necessary to maintain it at a higher temperature than for pneumonia, and it should never be allowed to fall below 65°. Greater care is also necessary to guard against draughts. The steam kettle should be used continuously. Hot poultices are required, and every second or third poultice should contain mustard. Stimulating liniments (turpentine or compound camphor) are useful, and should be rubbed on the chest and on the back energetically.

As much simple, nourishing food as the patient can take is necessary, but the tendency to digestive trouble must be kept in mind.

In the *early* stage a simple fever mixture should be employed :—

PRESCRIPTION 99

Citrate of potash	3 drachms.
Solution of acetate of ammonia	3 ounces.
Sal volatile	2½ drachms.
Syrup of ginger	½ ounce.
Water to 8 ounces.	

An eighth part to be taken every 2 or 3 hours.

In the *later* stages, especially if the breathing becomes more difficult, the complexion dusky, or the pulse very weak, alcohol is essential, and a good stimulating and tonic mixture, as follows :—

PRESCRIPTION 100

Carbonate of ammonia	24 grains.
Tincture of nux vomica	80 drops.
Tincture of digitalis	1 drachm.
Spirits of chloroform	2½ drachms.
Camphor water to 8 ounces.	

An eighth part to be taken every 3 hours.

If the breathing is oppressed and the phlegm is accumulating in large quantities, much relief is obtained by an occasional emetic. A

tablespoonful of ipecacuanha wine with one of water would be a suitable dose for this purpose. The great objection to this measure is the exhaustion produced by the effort of vomiting. A large amount of phlegm is thus cleared off the chest, and as soon as the stomach will bear it some milk and brandy should be given. The inhalation of oxygen gas is also a most useful remedy in these cases.

During convalescence great care is necessary to avoid chill. Good nourishing food, a couple of glasses of good burgundy a day, a strong tonic (Pr. 98), and cod-liver oil in as large doses as the stomach will bear, are to be advised. Change of air and rest of mind and body for a long period will be necessary before the health is fully restored.

CONGESTION OF THE LUNGS

Is an expression that is used somewhat vaguely both by professional men and by the public. It denotes that there is a larger amount of blood in the blood-vessels of the lungs than is normal, and may apply to either the arteries or the veins. When the expression is used popularly it may mean bronchitis or even pneumonia, but it is then quite an inaccurate term. Congestion of the arteries of the lung is the first stage of inflammation, but is so transitory as to be quite unimportant, and cannot be looked upon as a disease in itself. If it were possible to recognise it and apply suitable treatment at once, an attack of pneumonia might be averted.

The two most common forms of congestion of the lungs are that which occurs in extreme debility, and that which complicates many diseases of the heart. We will describe each briefly.

1. Congestion of the lungs may occur in association with any severe disease in which prostration and exhaustion are prominent symptoms. It is common in old age because the circulation in aged persons is very feeble, being carried on by a weakened heart, and whenever any extra strain is thrown upon the heart it fails to do its duty, and the blood stagnates and produces congestion. It is the lower and most dependent parts of the lungs that are almost invariably affected. Knowing this dangerous tendency, a doctor is always very loath to put an elderly patient to bed for any length of time, for this dangerous complication is likely to follow. As long as such a patient is able to be up and about and constantly change his position, his heart is sufficient for his needs, but when he lies on his back and his movements are curtailed, the blood is liable to stagnate in the dependent parts. If the patient is obliged to lie on his back the blood collects in the

lower and back part of the lungs; if he lies on his side, in the lung of that side.

The symptoms are blueness of the lips, face, hands, and feet, with difficulty of breathing, the breath being quick, short, and shallow.

Symptoms and Treatment. The treatment must be directed to supporting the patient's failing strength and stimulating his circulation. As much nutritious food should be taken as possible, with alcoholic stimulants in small quantities and at frequent intervals.

Particular attention should be paid to the patient's position in bed. He should be turned frequently from side to side, and never allowed to remain for many hours in the same position. If possible, he should sit up in bed for half an hour or so at a time, and be got out of bed as soon as his condition allows, for at any rate a short time every day. A stimulating and tonic mixture should be given if the other circumstances of his case permit, such as either of these:—

PRESCRIPTION 101

Sal volatile	.	.	.	.	.	$\frac{1}{2}$ ounce.
Ether	.	.	.	.	.	$2\frac{1}{2}$ drachms.
Tincture of lavender	.	.	.	.	.	2 drachms.
Chloroform water to 8 ounces.						

An eighth part to be taken every 3 or 4 hours.

PRESCRIPTION 102

Compound tincture of bark	.	.	.	$\frac{1}{2}$ ounce.
Carbonate of ammonia	.	.	.	24 grains.
Citrate of caffeine	.	.	.	16 grains.
Spirits of chloroform	.	.	.	$2\frac{1}{2}$ drachms.
Camphor water to 8 ounces.				

An eighth part to be taken every 3 or 4 hours.

2. The other form of congestion of the lungs which we must refer to is that which complicates many diseases of the heart. The loss of power due to the heart affection allows the cavities of this organ to become over-full and the veins of the lungs to be engorged and distended, the blood from the lungs being thus impeded in its flow. This congestion involves both lungs in their whole extent, and not only the dependent parts. The patient suffers much from cough, and the expectoration is streaked with blood; the breathing is difficult, especially on exertion; there is palpitation of the heart, with a sensation of tightness or oppression over the heart region. The treatment

entirely depends upon the cause, and is involved in that required for the heart affection, which will be found described elsewhere (p. 197).

EMPHYSEMA

Is a disease of the lungs which occurs not infrequently in those who have suffered from conditions in which either violent cough or great difficulty of breathing is a prominent symptom, such as

Causes. chronic bronchitis and asthma. It is also met with in those who play large wind instruments, and then results from the violent expiratory efforts that are necessary. A similar condition is met with in horses, and is known as "broken wind."

The change in the lungs consists in great distension of the air-cells, the walls of which become very thin and finally break into one another, forming cavities distinctly visible to the naked eye. As a result of this destruction of lung tissue there is less surface on which the blood can come in contact with the oxygen in the lungs, and there is also great loss of elasticity of the lung itself, and consequent difficulty in driving the air out of the chest.

This change in the structure of the lungs is the cause of the symptoms, the most prominent being shortness of breath. The patient complains of a feeling of oppression, or "a smothering in the chest," and upon the slightest exertion gets out of

Symptoms. breath. The difficulty of breathing grows worse as time goes on, and finally develops into an almost asthmatic condition, the breathing being difficult and somewhat noisy even when the patient is at rest. The chest becomes enlarged and rounded, a marked stoop is developed, the shoulders are raised, and the neck is apparently shortened. A troublesome suffocating cough is usually present, with more or less expectoration. As a result of interference with the circulation of the blood through the lungs, congestion of blood appears in various parts: the face grows bluish, dusky, and puffy, the legs swell, the liver and kidneys act imperfectly, the breathing is laboured, the voice feeble, and the patient looks worn, aged, and wasted.

Treatment must be directed to the improvement of the general health, as it is quite beyond our powers to restore the damaged air-cells. The patient must dress warmly and avoid all risks of chill, as his great danger is an attack of bronchitis, however slight. When possible he should winter in a warm climate. The digestion must be kept in order, as indigestion, flatulence, and constipation always increase the severity of the symptoms, especially

the difficulty of breathing. Anything like violent exertion should be avoided, but gentle exercise, such as walking and quiet riding, is beneficial. Cod-liver oil is useful, as also are tonics, especially iron and strychnia.

PRESCRIPTION 103

Tincture of perchloride of iron	. . .	1½ drachms.
Solution of strychnia	. . . . .	24 drops.
Glycerine	. . . . .	½ ounce.
Chloroform water	to 8 ounces.	

An eighth part to be taken 3 times a day after meals.

Iodide of potash in small doses, 2 grains in a tablespoonful of water three times daily, sometimes relieves the asthma, and inhalations of oxygen gas the imperfect aëration of the blood.

BLOOD-SPITTING

Hæmoptysis is not necessarily a matter of serious importance. How is it possible to distinguish the serious from the trivial cases? By discovering the source of the hæmorrhage. When the gums are inflamed and sore they are liable to bleed, and bleeding may occur from any part of the cavities of the nose and throat.

Causes and Symptoms.

Much needless worry is caused in certain cases of nose-bleeding in which the blood has run down at the back into the throat and mouth and has been expectorated. Occasionally perfectly healthy young persons may suffer from blood-spitting, which continues for a few days and then disappears never to return, leaving them without any weakness or evil after-effects. The serious forms of hæmorrhage are those in which the blood comes from the lungs, and it is practically impossible for this to occur without coughing. The presence of a cough is therefore an important sign. In many early cases of consumption the cough that is followed by blood-spitting is so slight that it may be almost overlooked, and yet, if it is noticed that before the blood appears there is always some cough, we must carry our observations farther, and if other consumptive symptoms are present, such as night sweats, loss of flesh, and a rise of temperature at bed-time, a physician should be at once consulted, for it is in this stage that consumption is one of the most curable of diseases. The blood may also come from the stomach. Blood from this source can usually be distinguished from blood arising from other parts; it is mixed with food, is dark red or black in colour, and is usually accompanied with symptoms of stomach disease, whilst blood from

the lungs is brought up by coughing, is mixed with phlegm, is frothy, is bright red in colour, and is accompanied by symptoms of lung disease. Blood-spitting also occurs in certain forms of heart disease, in which the circulation of the blood through the lungs is impeded, and the small, congested vessels give way.

The treatment of the simpler forms of hæmorrhage can be carried out without medical aid, but bleeding from the lungs or stomach is too serious for domestic treatment. Bleeding from the gums

Treatment. and throat is easily stopped by an astringent mouth-wash or gargle, a teaspoonful of alum in a tumblerful of water being usually efficacious. Nose-bleeding is more difficult to stop, and its treatment is described elsewhere. If a sudden attack of bleeding from the lungs occurs it is well to send for the doctor at once, and in the meantime do all we can to stop it. The first step is to put the patient to bed and keep him perfectly still, quiet, and cool. Generally this proves sufficient to check the bleeding. If, however, it continues, send for some ice, and in the meantime apply a cloth wrung out of cold water to the upper part of the chest. When the ice arrives break it in small pieces and put it into a waterproof bag (an ordinary sponge-bag will do excellently), and apply that to the chest; or, if no bag is available, put the ice on the chest direct. Give no stimulants of any kind, for they will only make things worse, but let the patient suck small pieces of ice and sip iced drinks. It is important, if the help of a doctor cannot be obtained, to keep the patient quite still in bed and on very light diet for a few days, and this medicine may be administered :

PRESCRIPTION 104

Aromatic sulphuric acid . . . 1½ drachms.

Water to 4 ounces.

A tablespoonful to be taken every hour until the bleeding ceases.

To each dose of this mixture 15 drops of paregoric elixir should be added if there is much cough, for the exertion of coughing tends to keep up the bleeding. The inhalation of 3 to 5 drops of nitrite of amyl from a capsule will aid in checking blood-spitting by drawing the blood away from the vessels of the lungs to other parts. The bowels should be well cleared with a dessertspoonful of Epsom salts.

PLEURISY

Is an inflammation of the pleura or membrane between the lungs and the chest walls. When the pleura is inflamed the first change in

it is that it becomes swollen, dry, and very sensitive, and with each breath its two surfaces—that which covers the chest wall and that which covers the lung—rub against one another and cause the most acute pain, called a pleuritic “stitch.” The next change produced by inflammation is the oozing of watery fluid from the inflamed surface into the bag of the pleura, and as this collects it separates the sore surfaces, and the “stitch” disappears. The fluid may continue to collect until the bag gets full and distended, and a “pleural effusion” is formed, or what is called “water on the chest.” This fluid is the

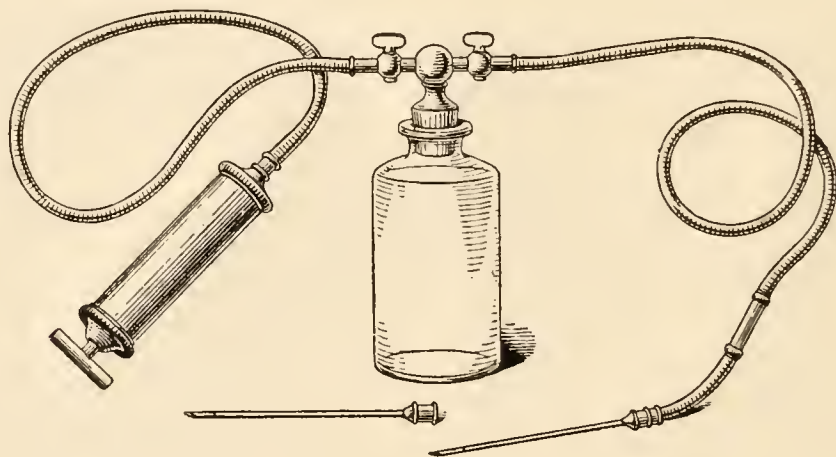


Fig. 34.—ASPIRATOR.

watery material of the blood, and as it collects it pushes the lung away from the chest wall. In extreme cases the lung may be pushed backwards against the spine, and the whole of that side of the chest be occupied with water. In such cases the compressed lung is quite put out of use, and no air enters it during the movements of respiration. If the fluid is allowed to remain a long time in this cavity the lung becomes fixed in its abnormal position, and will not expand again when the fluid disappears. To avoid so serious a result it often becomes necessary for the doctor to remove the fluid. This is done with a hollow needle, which is passed through the soft part of the chest walls between the ribs, and is connected by a soft rubber tube with a bottle from which all the air has been withdrawn by an air-pump. When the tap on the tube is turned the water flows out of the chest into the bottle, to occupy the place of the pumped-out air. This instrument is called an aspirator (Fig. 34). In most cases, when once the water has been drawn off it does not collect again, and if the

operation has been done sufficiently early the air enters the lung, which expands and fills the chest, again coming into contact with the chest wall. The two surfaces of the pleura once more touch one another, and in many cases the "stitch" returns, but in this instance the pain is a good sign as showing that water no longer separates the surfaces. The inflamed surfaces may not only touch one another, but may stick together and form bands or adhesions.

Sometimes an unfortunate complication occurs in pleurisy, and the watery fluid gradually becomes mixed with matter which is poured out from the inflamed surfaces; it then forms what is called an empyema, or "abscess of the chest." This is a serious condition. The matter may be removed by the aspirator, but it generally re-forms, and it is then necessary for the surgeon to make an opening into the chest between the ribs and allow the matter to run out through a tube as it is formed.

We must now turn to the causes of pleurisy. The most common is cold, exposure to damp, or sitting in a draught. It may result from a blow or fall on the chest, or from the irritation of the
Causes. pleura by a broken rib. It is a very common complication of disease of the lungs, the inflammation spreading in pneumonia or consumption from the lung to the pleura. Many attacks come on as part of a general disease, such as acute rheumatism, infectious fever, or tuberculosis (consumption), but both rheumatism and consumption may cause pleurisy without other signs of their presence being evident.

One of the first symptoms of the disease is the sharp, stabbing pain in the side, which comes on with any movement of the body and with every deep breath. With the pain there is usually some
Symptoms. fever and a feeling of chilliness, or even shivering. Fever and "stitch" occurring together are enough to make us suspect pleurisy. The breathing is affected; it is short, jerky, and shallow, and, to avoid bringing on the pain, is much restrained. A slight cough comes on which is exceedingly painful, and is half-suppressed, dry, and ineffectual; there is either no expectoration or a little frothy fluid. The temperature is not usually very high; it may reach 104° , but is much more frequently only 100° or 101° . With the increase in temperature appear a hot skin, quickened pulse, impaired appetite, furred tongue, increased thirst, headache, and pain about the body. This is the stage of *dry pleurisy*, which, if not checked by treatment, passes into a *pleural effusion*. The pain passes off, or, at any rate, is much less sharp, but the breathing grows more difficult and more

rapid, and the slightest exertion puts the patient out of breath. In the majority of cases, at the end of a week the fluid has ceased to increase, and then in a day or two begins to grow less. The symptoms now subside, the breathing gets easier, fever disappears, and the patient gradually passes into convalescence by daily slight improvement, rather than by any definite sudden change in his condition. The



Fig. 35.—BANDAGE FOR PLEURISY.

alarming symptom of a return of pain need, as we have explained, cause no anxiety, but may be looked upon as a hopeful sign. If, however, the fluid continues to increase in amount the breathing becomes more impeded. When it is on the left side the heart is displaced. The general health suffers, and if the case be neglected the fluid may, as we have seen, gradually turn into matter, which will find its way to the surface, and discharge either through the lung by coughing, or through the chest wall.

The treatment of pleurisy ought most certainly to be carried out

under the orders of a doctor whenever possible. The patient must be put to bed and be kept on light simple food. A hot linseed poultice

Treatment. should be applied to the side to ease the pain, or a mustard leaf or a belladonna plaster. If these measures are not effectual nothing is better than to strap up the painful side with plaster. To do this a large sheet of lead or other adhesive plaster should be obtained, about 18 in. square, and cut into strips about 3 in. wide. A strip should then be warmed in front of the fire or against a jug of hot water, and when it is quite moist and sticky the patient must empty his chest of air as completely as possible, and the strip of plaster be applied to the lowest part of the chest, beginning at the spine, passing downwards and forwards in the direction of the ribs, and reaching just beyond the middle line in front. The next strip should be placed just below the first at the back, and cross it, passing forwards and upwards to the middle line in front. The third strip runs parallel with the first, overlapping it about 1 in., the fourth parallel with the second, also overlapping it, and so on until the painful part has been well covered (Fig. 35). Each strip is put on after the patient has well emptied his chest, for the object is to secure the ribs in this position and prevent their movements by the pressure of the plaster.

A dose of Dover's powder, 10 grains, should be given at bed-time, and the following mixture administered:—

PRESCRIPTION 105

Bicarbonate of soda	. . . . .	2½ drachms.
Solution of acetate of ammonia	. . . . .	2 ounces.
Citrate of potash	. . . . .	2½ drachms.
Tincture of lemons	. . . . .	2 drachms.
Syrup	. . . . .	½ ounce.
Water	to 8 ounces.	

An eighth part to be taken every 3 or 4 hours, with a 10 grain powder of citric acid.

If the pain is very severe, 7 to 10 drops of the solution of morphia may be added to each dose until relief is obtained; and if the fever is high 10 grains of salicylate of soda may be added also.

When the pain has disappeared the plaster may be taken off and the stickiness removed with some spirits of turpentine. The chest may then be painted daily over the lower half of the affected side with tincture of iodine, the skin being kept a little sore so as to act as a

counter-irritant and thus encourage the absorption of the fluid. The same effect may be obtained by substituting for the iodine either ointment of iodide of potash or ointment of oleate of mercury, which should be rubbed into the chest. Occasional doses of Hunyadi water are necessary, as the bowels should be made to act rather freely.

Convalescence may be hastened by good food and tonics, but these must not be begun until all fever has disappeared. The complete recovery of the local condition is often very tedious, and always takes some time, and yet it is of the utmost importance to secure it if possible, for an incomplete cure is likely to be followed by a return of the disease, or even by some tubercular trouble. Change of air, absence of worry and overwork, warm clothes, and hygienic surroundings are all useful auxiliaries in bringing about a thorough recovery.

CONSUMPTION

The technical term for consumption is phthisis, which means a "wasting away," and was given to it because one of its most prominent symptoms is great emaciation. The disease has been known from very early days, but its true nature and cause have only been discovered in our own times. A hundred years ago a great physician named Laennec discovered that consumption began by the formation of small, greyish-white bodies scattered throughout the tissue of the lungs, to which he gave the name of tubercles. These grew larger and, as they grew, became softer, destroying the lung substance around them; they formed a sort of discharge, which was expectorated, leaving behind a small hollow or cavity in the lung. So the lung was destroyed, and the patient wasted and died.

But why do these tubercles form, and what is their cause? This was a discovery left for our own days, and in 1882 it was made by the great German biologist, Dr. Koch. He discovered that the tubercles which are the essential part of consumption are caused by the presence of microscopic germs or bacilli, to which the name of tubercle bacilli has been given. These bacilli are minute vegetable organisms, in shape like little rods, which rapidly increase in number. They are so small that it requires a powerful microscope to discover them, and it has been estimated that it would take 600,000,000 of them to cover a square inch. But in spite of this, now that they have been discovered, anyone who has ordinary skill with the microscope can find them with the help of a special colouring matter or stain

which only colours the bacilli, leaving the material surrounding them colourless.

Since this wonderful discovery all our ideas of consumption have been altered, all our preconceived notions have been upset. We had almost begun to look upon the disease as incurable; now we look upon it much more hopefully. A few years ago it killed as many people in this country as all the other infectious diseases put together. It carried off in England and Wales as many as 70,000 victims every year, and in London alone 8,000 persons died from it in one year. It is particularly prevalent in countries where the climate is damp and variable, and amongst those people who live in crowded towns or in unhealthy surroundings. Dampness of soil and imperfect drainage probably act as predisposing causes by injuring the general health, and by producing many cases of catarrh and delicacy of the chest. There is no doubt that frequent attacks of catarrh, or imperfectly cured attacks, produce a favourable soil for the growth of the tubercle bacillus. All inflammatory diseases of the respiratory organs are in the same way predisposing causes. Many a case of chronic bronchitis, many a prolonged attack of pneumonia, gradually pass into one of phthisis, the exact time at which the change takes place being impossible to discover. There are certain trades which are dangerous because of their liability to produce chronic irritation of the lungs and air passages, which is favourable to the bacillus.

We next pass to the important question of inheritance. It used to be difficult to avoid the dreadful belief that a large proportion of the human race were born with the seeds of this dread disease already sown in their bodies, and that, do what they could, it would sooner or later seize them in its clutches and carry them off. But now that we know consumption to be a germ disease, all these ideas must be given up. It has been definitely proved that no one is born with the germs within them, and that in no sense is consumption inherited. How, then, must the various facts which seem to prove inheritance be explained? How is it that consumption so evidently runs in families, and that one member after another sickens and dies from the disease? There is no doubt that the children of consumptive parents are delicate, and have great tendency to weakness of the chest. They are often born with a catarrhal tendency; they catch cold easily, throw off the attack with difficulty, and have other inimical predispositions. If, therefore, they are exposed to the poison of tubercle they are less capable than more robust persons of resisting the attack; they

form a more suitable soil for the growth of the bacillus. But they must be exposed to infection; the germ is not born in them.

This takes us on to a further explanation of what appears like inheritance. The child of a tuberculous parent is born into an atmosphere impregnated, as it were, with the disease. Tubercle bacilli are in the air, in the clothes—everywhere. The child is constantly exposed to infection; every time he is kissed, or goes near his parent, the bacilli are likely to be inhaled, and will sooner or later take root and develop.

That consumption is infectious is no longer to be doubted—not to the same extent as scarlet fever or whooping-cough, but there is absolute proof that it can be caught, that the tubercle bacilli can pass from one human body to another. It would seem that there must be a somewhat prolonged exposure to the infection, and a weakened resistance in the person attacked, but those who live with consumptive persons are constantly exposed to the risk, and it is easy to understand that at some time when they are out of health, below par, worn out with work, or exhausted by worry, their power of resistance is too weak to protect them, and the germ wins the fight.

But if it is true that tubercle bacilli are always with us, how does anyone remain free from consumption? This is a very interesting question, which applies to all germ diseases, and not merely to tuberculosis. For germs of all sorts are constantly entering our blood. In a healthy subject the white blood-cells attack the germs, seize upon them and devour them, and render them in this way innocuous to the body. But in a person who takes the disease the white blood-cells have been unable to do this; they have been worsted in the fight. How is this? The reason is that the white blood-cells are fastidious in their tastes, and like the bacilli properly prepared for their consumption. This preparation is performed in the fluid part of the blood by substances called opsonins, and if these are deficient in a person's blood the bacilli win the day, and he falls a victim to disease. But we need not pursue this subject, which has been already dealt with in the Introduction.

There are two ways by which the bacilli gain entrance to the body: we either breathe them or we swallow them.

Where do the bacilli which we *breathe* come from? They come from the bodies of consumptive persons. The expectoration of these people, especially if their disease is in an advanced state, almost always contains bacilli, sometimes in incredible quantities. When they cough, or even speak, they scatter them about in the air around them, and

anyone who breathes this air draws the bacilli into the lungs. The small particles full of bacilli may fall about on surrounding objects—on the linen, on the floor—anywhere; and, when they have dried, they may be carried about in the air as poisonous dust, which may infect anyone who inhales it.

Again, where do the bacilli come from that we *swallow*? From diseased animals whose flesh we eat or whose milk we drink. Tuberculosis is a very common disease amongst cattle, and probably almost a third of the cattle in this country are affected by it to some extent. If the diseased parts are eaten, tubercle bacilli may thus find their way into the body. The milk of cows affected by tuberculosis is not necessarily dangerous to drink, but if the udders of the cows are affected by the disease there is considered to be great danger.

These, then, are the three chief ways by which we may catch consumption: by the air we breathe, by the meat we eat, and by the milk we drink. It ought, perhaps, to be mentioned that so great an authority as the discoverer of the tubercle bacillus, Dr. Koch himself, considers human tuberculosis to be different from bovine tuberculosis, and holds that the disease cannot be transmitted from a cow to man, and therefore he does not consider it necessary that precautions should be taken against this form of infection. But this belief is not shared by most other authorities on the subject, and it will be wise, therefore, for us to avoid all liability to infection from diseased animals.

Turning to the symptoms of consumption, we must strongly insist upon the importance of recognising the disease in its very earliest stage, and therefore of paying particular attention to the **Symptoms.** symptoms which first appear. They come on almost imperceptibly. The first to be noticed is cough, a troublesome, irritating, hacking cough, which is most persistent. This may be left after a bad cold or some more serious affection of the respiratory organs, as bronchitis, pneumonia, and pleurisy. At first it probably excites no alarm, and may be too slight to attract even the patient's attention, but it grows worse, is very constant, and seems to receive no benefit from the ordinary forms of treatment. This probably dates from, and is due to, the introduction of the bacilli into the lung and the formation of tubercles. At the outset it is unaccompanied by expectoration, but the tubercles soon cause irritation, and a small quantity of mucus is spat up, which is watery or frothy. At the same time the patient's health begins to suffer; he grows pale and looks ill, both his strength and weight begin to diminish, and the diminution is progressive. This,

then, is the combination of symptoms which marks early consumption : *persistent cough with mucous expectoration, and emaciation with loss of strength.*

The tubercles increase in number and size, and produce greater irritation; the expectoration grows freer and thicker; perspirations occur and become troublesome, especially at night; the temperature is raised, the pulse is quickened, and the emaciation becomes more evident. The "night sweats" are a serious sign, and ought to arouse alarm. They are sometimes very profuse; they may occur several times in a night, and the patient can only be made comfortable by having all the clothes changed and the body rubbed dry. In the later stages of the illness they come on in the daytime as well as at night, especially upon the slightest exertion.

The rise of temperature is another outstanding symptom, the significance of which should be understood. If there is any active or advancing tubercular disease of the lungs some fever is sure to occur. The temperature should be taken at bed-time, or some time in the evening from six to ten o'clock, and if it is found to be normal for several evenings in succession anxiety may be allayed, for in consumption there is almost always fever of an evening. It may be only slight— 99.5° or 100° —but it sometimes rises to as high as 103° or 104° . Even when it is high at night it nearly always subsides in the morning, and may even fall below normal. The presence, therefore, at bed-time of fever which disappears in the morning is one of the symptoms of early consumption. As the disease progresses the fever grows more marked, and has a peculiar character; it rises every night and falls very low every morning, and the difference between the two temperatures may be many degrees.

In the later stages of phthisis the tubercles increase rapidly in number, run together and coalesce, and gradually become softer and form a thick, yellowish discharge, which finds its way into the air passages and is expectorated in large quantities, and with it small pieces of broken-down lung. If this expectoration is examined under the microscope the tubercle bacilli will be found mixed with small particles of destroyed lung. The bacilli can practically always be discovered in the later stages of the disease, but, as we have explained, the great aim of the physician is to recognise the very earliest signs of their occurrence.

Blood-spitting, or hæmoptysis, as it is technically called, is another very frequent symptom of consumption. It may occur as one of the

earliest symptoms, a small quantity of bright blood being brought up with a slight cough, or sometimes with almost no cough, the blood rising in the throat and being expectorated. In the later stages, as the lung gets destroyed, very sharp hæmorrhage may come on, and some cases end fatally in this way, a large quantity of blood being poured out, causing fainting and suffocation. This condition is sometimes spoken of as "breaking a blood-vessel." Spitting up blood is not, of course, a proof of consumption; it may be due to quite a variety of causes (p. 290); but if it continues for any length of time, or if it is at all profuse, and particularly if it occurs with any other symptoms, such as cough, wasting, or fever at night, a doctor's advice should be sought without delay. Even a skilled physician, with the various appliances and methods of examination at his disposal, is not always able to speak positively in the early stage of phthisis. How much more difficult, therefore, must it be for an unskilled person. Another difficulty is that when the expectoration consists only of a small quantity of pure blood unmixed with phlegm, it is very often impossible to discover any of the tubercle bacilli in it.

Loss of flesh is an almost constant symptom of tuberculosis of the lungs, but by itself it does not prove that tuberculosis is present. If an individual rapidly loses a few pounds of flesh and then rapidly regains it, or if he grows thinner for a time and then remains stationary, the circumstance is of no importance. The emaciation of consumption is continuous, unless checked by treatment, and with the loss of flesh the strength diminishes; the patient is fatigued by the slightest exertion, grows pale and haggard, coughs constantly; his appetite fails, and he breaks into a perspiration on the smallest movement. Pain is not at all a prominent symptom. It is sometimes, though not always, felt in the chest, especially in the region under one or other collar-bone, and may in this way give some indication of the side on which the lung is affected. Occasionally also there is a sharp pain or "stitch" in this region, which passes off in a few days, and is caused by a slight attack of pleurisy at that spot. It is wonderful how little either pain or any other symptom is complained of, as a rule, by consumptive persons. Of course the cough, the sweats, and the weakness are all difficult to bear, but it is very characteristic of consumption that the sufferer is always inclined to look less seriously on his condition than his friends. He sees himself growing thinner and weaker, and yet he is always sanguine of ultimately getting well.

Towards the end, tubercular disease is likely to break out in other

organs of the body besides the lungs. It very commonly affects the larynx, when the patient grows hoarse and almost voiceless, has a most troublesome and irritating cough, and there is some blood-spitting from little ulcers which form in the mucous membrane. This forms a very serious complication, and cases of laryngeal phthisis often run a very rapid course. Another frequent complication is tubercular ulceration of the intestines, which perhaps may be traced to the direct inoculation of the bowels with tubercle bacilli swallowed in the phlegm. It produces a severe and very intractable form of diarrhœa, which, if not checked rapidly, reduces the strength and brings the patient to death's door.

The treatment of consumption must be divided into preventive and curative. The malady is most certainly curable, and not only is it curable, but, if treated early, it is one of the most curable of all diseases. It is perhaps not generally known that, even before the tubercle bacilli were discovered, a very large number of consumptives recovered—probably as many as died. It was a common experience to find, by examination after death, that persons who had died of other complaints had some time previously suffered from tubercular disease, and that this had healed and left its mark in the form of scars in the lung. In these cases the body had evidently had sufficient strength to grapple with and destroy the attacking germs without extraneous assistance. The popular dread of consumption will doubtless soon disappear when the cause of the disease, the modes in which it is spread, the means by which it may be prevented and cured, have become generally known. The change in our methods of treatment has already had a marked influence on the mortality tables.

There can be no doubt that one of the most common means by which consumption is spread is by the expectoration of consumptive patients, and it is evident that this can only occur if those affected spit about in public places or in their homes. If this disgusting habit were to disappear the danger of infection would be very greatly diminished. The habit, so far as public places are concerned, can only be stopped by making it a punishable offence, or by influencing public opinion against it as being both dirty and dangerous. It might at first be thought that the spitting of healthy persons involves no danger, but it is to be remembered that many who are apparently perfectly healthy may be developing the disease, and may have tubercle bacilli in their sputum. The early stages of consumption are, as we have already explained, so

**Preventive
Measures:
General.**

difficult to recognise that it is hopeless to try to distinguish between the healthy and the affected, and to assume that spitting in public can in any circumstances be free from danger. The first step in the prevention of consumption would be therefore entirely to abolish this obnoxious habit. As spitting is an absolute necessity for those who are already consumptive we must take measures to obviate the danger: we must provide some easy method of disposing of tuberculous expectoration, so that it may cease to be a danger to others. Now, the only effectual way to destroy the sputum is to burn it, and to do this it is necessary for consumptives to carry with them some simple form of spittoon into which they can expectorate, burning the sputum when they get home. The habit of spitting into a pocket-handkerchief is most unsatisfactory, for the germs are not destroyed in the process of washing, and may infect other clothes. Little paper spittoons are now sold at a very low price (forty for a shilling), and if even this expense is too great it has been suggested that sanitary paper, which is within the means of everyone, should be used for the purpose, and that this should be burnt in the fire, or, what is even easier and is quite effectual, set alight with a match and so destroyed.

It may seem somewhat difficult to carry out these methods of precaution, but much has already been done in this direction. In many public conveyances—trains, omnibuses, and tramcars—and in many places of public resort, notices are posted cautioning people against spitting; and occasionally the law is set in motion against the habit. The United States was one of the first countries to make spitting in public places punishable by fine, or even by imprisonment.

Another important measure of prevention is the disinfection of rooms or houses which have been inhabited by consumptives, or in which a person has died of consumption. The importance of disinfection is evident from the fact that experiments have conclusively proved that the dust of rooms occupied by persons suffering from the disease contains large quantities of tubercle bacilli. The disinfection of the room is best carried out by washing everything possible—floor, walls, furniture, etc.—with a solution of chlorinated lime of the strength of $1\frac{1}{2}$ ounces to the gallon of water, limewashing the ceilings, and disinfecting the remaining articles, such as clothes and bedding, by steam. In clean houses, where there is reason to consider that the walls will have had no direct soiling with expectoration, it has been found sufficient to rub them down with dough, especially attending to the angles and corners, where dust is liable to collect.

The spread of consumption by infected milk and meat can only be stopped by the most careful supervision of these articles of food by public officials, and the destruction of all that is condemned. But this cannot at present be done, as there is no law that requires it; and if all the cattle affected by tuberculosis were to be slaughtered it would entail an immense loss upon those engaged in dairy-farming, stock-raising, and in the distribution of milk and meat. However, the law orders a large amount of supervision; much is being done to protect the public from diseased meat and from the milk of diseased animals, and when public opinion is ripe for them more stringent measures will no doubt be taken.

Another important measure of prevention consists in the notification of cases of consumption to the public authorities in the same way as other infectious diseases, such as scarlet fever and diphtheria. This regulation has been enforced in Norway since the year 1900. There the public authorities see that the houses of affected persons are kept clean and sanitary, that the expectoration and other discharges are disinfected or destroyed, and that the rooms, clothes, and bedding are properly cleaned before being used by other persons. In this country notification was at first only compulsory in Poor-law and hospital cases of tuberculosis, while in certain towns voluntary notification was in operation. The result was so far very satisfactory. But it was clear that nothing short of universal compulsory notification would meet the case, and now this system is in operation. Need still exists, however, for the education of public opinion, so that tuberculosis may come to be regarded as a veritably infectious disease, which only differs from the infectious fevers in the greater ease with which it could be stamped out if adequate precautions were taken.

A society has been formed for this purpose in England, called the National Association for the Prevention of Consumption, and much good work has already been done. In France, anti-tubercular dispensaries have been started in many towns, at which any poor persons may receive gratuitous advice and general information on all matters connected with tubercular disease; and similar institutions have now been established in this country.

The first precautionary step for the individual is the removal of the child of consumptive parents from the risk of infection in the home, or, if this is impossible, to carry out careful measures of disinfection of the sputum, and to make the home as clean and healthy as possible. The general health of persons with a tendency to the disease requires

constant attention. They must live in surroundings as healthy as possible, must have plenty of fresh air and outdoor exercise; they must develop their bodies by exercises, must learn to breathe properly, and so enlarge their lung capacity; must attend to their digestions and eat well of simple and nourishing food, and dress carefully in order to avoid catching cold and setting up affections of the respiratory organs. Cold and damp houses, ill-ventilated and stuffy rooms occupied by many persons, damp soil, such as occurs in low-lying districts, are all particularly dangerous. Employment in which the air that has to be breathed contains solid or gaseous irritating impurities must be avoided. It is of the utmost importance that persons with delicate chests should never neglect a cold or other affection of the respiratory organs, and if the symptoms of any such affection tend to persist for any length of time they should consult a medical man and discover the cause of the suspicious symptoms. Much benefit, too, is obtained by such persons if the winter months can be spent in a mild and equable climate.

The aims of treatment are to arrest the progress of the disease and destroy the bacilli, to increase the nutrition of the body and thus strengthen its power of resistance, to relieve urgent symptoms when they arise, and finally, when curative measures are hopeless, to do all that is possible to relieve suffering. The various measures at our disposal may be divided into treatment by hygiene, climate, diet, and drugs.

From hygienic measures we expect much. If we put our patient into those surroundings which we know to be best for him in the early stage of his disease, we shall always obtain improvement in his condition. Opinion is now unanimous that fresh air and sunshine are the most powerful agents in fighting the tubercle bacilli. Among the well-to-do it is possible to provide suitable surroundings in their own homes, but for others it is necessary that they be placed in some public institution or private sanatorium. The open-air treatment is now most popular amongst those who have had much experience in the treatment of consumption. The patient lives, day and night and all the year round, in open air as far as is compatible with safety. He is sheltered from wind and rain, but, however cold it may be, the fresh air is allowed to play freely around him. The first idea of such treatment is naturally that the patient will catch cold and suffer accordingly, but experience shows that this is not the case.

Instead, he gets braced up, his appetite improves, his weight increases, and his symptoms are relieved.

There is little doubt that the open air is more efficacious than even the most perfectly ventilated room, and it should always be preferred if the patient's health is in a condition to bear it. Sanatoria for the open-air and general treatment of consumption are now to be found in many places in our own country and abroad, and they can be strongly recommended. Sanatorium treatment includes unlimited fresh air and light, plenty of nutritious food at frequent intervals, the utmost cleanliness and freedom from dust, the most perfect hygienic surroundings, and complete freedom from all anxiety of mind and bodily exertion. Sanatoria are under the supervision of medical men who have made the matter a special study and have had great experience in it. Almost the only objection to sanatorium treatment is that in most cases it necessitates separation from friends and home surroundings, though this is advantageous rather than otherwise when the home is unhealthy and the friends are injudicious.

The treatment by climate is of great importance, but is now viewed from a standpoint different from that of a few years ago. It was once the first thought of a consumptive patient's friends to send the sufferer away, apparently anywhere, so long as it was out of England, and many sad cases happened of young people arriving in a foreign land, only to die amongst strangers. At the present time the opinion of the profession is that there is no special climate for all cases; wherever the air is fresh and dry, and other circumstances are suitable, the patient can carry out a "cure" with every hope of success. It is right to select as cold a climate as the patient can bear; for the old cannot bear the cold that would benefit the young, nor can those who are seriously ill bear a climate that would suit those with milder symptoms. To quote from Professor Clifford Allbutt, the best climate for scrofulous children "is that of the sea; for the adult in the third or fourth decade of life, the Alpine climate, less windy than the sea, may be the best; the elderly must be content with a milder and more equable resort." The parts of England most suitable are probably Kent, Norfolk, and Suffolk for the summer months, and Ventnor, Bournemouth, Hastings, and Torquay for the winter.

The food of consumptive persons should be simple, light, and nutritious, and should be taken more frequently than in health. The patient should, in fact, be somewhat overfed; that is, should be given

more food than would be requisite or wise ordinarily; but—and this is of great importance—his digestion must not be overworked. This

Food. is the great difficulty, for in phthisis the patient is usually much debilitated, and his digestion works but badly and is easily upset. When treatment is started, and when the appetite is bad, food must be given with great care, but as soon as the appetite improves it may be increased. Milk is a most useful food, and is especially required whilst the patient is feverish. Fatty foods are good, such as milk, cream, butter, fat bacon, and suet. Meat is suitable in most cases; it should be well cooked, and combined with a moderate quantity of vegetables. Bread and other starchy foods should form part of the diet, but the starchy and sweet articles are somewhat inclined to upset the digestion. In severe cases it may be necessary to make use of predigested and peptonised foods, as well as of meat essences, beaten-up eggs, and raw meat pounded to a pulp. In most cases stimulants are unnecessary, but they will be found useful if given for a few days at a time when the patient is feeling weak and low-spirited, and they aid the digestion in conditions of debility. It is necessary to watch the patient's weight. If this increases, things are improving with him; if it grows less, more food is called for and more frequent meals must be taken.

The treatment by drugs must not be looked upon as useless or even unimportant because other means are being employed. The first

Drugs. which we will mention is cod-liver oil, because its value is undoubted, and because it really forms almost an article of diet; it is useful as being one means of supplying the body with fat and improving its nutrition, but it is of more value than simple oil. It should be given at first in teaspoonful doses, gradually increased to tablespoonfuls, a dose being given three times a day after meals. Its flavour may be somewhat hidden by adding to it orange wine, milk, coffee, or sherry. Some patients prefer it mixed with malt.

Since the discovery of the tubercle bacillus many drugs have been tried with the idea of destroying it: for instance, iodoform 1 grain with croton chloral 2 grains and creasote 1 drop, in a pill; or for children, iodoform $\frac{1}{2}$ grain in a dessertspoonful of cod-liver oil three times a day after food. Creasote, also, and some of its derivatives, may be taken in capsules, commencing with 1-drop doses and gradually increasing to 5 drops, three times a day after food; or in the form of guaiacol, 3 drops in perles or capsules, to be taken after food two or three times a day; or in the following mixture:—

PRESCRIPTION 106

Creasotal or creasote carbonate	4 drachms
Glycerine	1 ounce
Peppermint water	$\frac{1}{2}$ pint.

A tablespoonful to be taken with water 3 times a day.

But none of these should be tried if there is hæmorrhage from the lungs. Much benefit also has been obtained by the inhalation of formic aldehyde as a spray of formalin, or as a gas.

PRESCRIPTION 107

Formalin	1 drachm
Glycerine	$4\frac{1}{2}$ drachms
Water to 5 ounces.	

To be used as a spray and inhaled for five minutes several times a day.

Tablets of paroform, or formalin disinfecting tablets, are prepared for use in a vaporiser, the gas from which can be inhaled, but it must be used with caution, as at first it causes a good deal of irritation. Many other germ-destroying drugs have been employed in a similar manner, but, like formalin, they require the supervision of a professional man to test the results.

We must next deal with the drug treatment of special symptoms in consumption. If the cough is very troublesome and is not accompanied by much expectoration, the following sedative mixtures will be found useful:—

PRESCRIPTION 108

Glyco-heroin	1 ounce.
Syrup of tolu	$\frac{1}{2}$ ounce.
Spirits of chloroform	2 drachms.
Water to 8 ounces.	

An eighth part to be taken every 3 or 4 hours.

PRESCRIPTION 109

Codeina	2 grains.
Dilute hydrochloric acid	40 drops.
Spirits of chloroform	2 drachms.
Syrup of lemon	$2\frac{1}{2}$ drachms.
Water to 2 ounces.	

A dessertspoonful to be taken occasionally when the cough is troublesome.

The cough, and with it the pain in the chest and the local inflammation of the lung, may also be relieved by painting the upper part of the affected side of the chest with liniment of iodine, or rubbing it

back and front with the turpentine and acetic acid liniment. If the fever is high, especially at night, it will be reduced by this mixture:—

PRESCRIPTION 110

Salicylate of soda	80 grains.
Tincture of lemons	2½ drachms.
Water to 8 ounces.	

An eighth part to be taken every 4 or 6 hours.

The body, too, should be sponged every night with vinegar and water. This will also help to check the night sweats, and will be assisted by a pill:—

PRESCRIPTION 111

Oxide of zinc	2 grains.
Extract of belladonna	⅓ grain.

Make a pill. One to be taken every night at bedtime.

The bowels must be kept regular with gentle laxatives and an occasional mild mercurial pill; whilst if there is diarrhœa the diet must be attended to, and only very light and unirritating articles taken for a day or so, with the following mixture:—

PRESCRIPTION 112

Decoction of logwood	4 ounces.
Carbonate of bismuth	80 grains.
Syrup of ginger	½ ounce.
Water to 8 ounces.	

An eighth part to be taken every 3 or 4 hours.

If hæmorrhage from the lungs occurs, as it may at any time in a case of phthisis, the patient must be at once put to bed and be kept as still and quiet as possible, being allowed neither to speak nor to move. He should have no stimulants and only the lightest food, and should suck pieces of ice; and ice, or rags soaked in iced water, should be applied to the upper part of the chest on the affected side. If the cough is troublesome it will increase the bleeding, and a dose of the sedative cough mixture (Pr. 108) should be administered at once.

Tuberculin is a substance obtained from the tubercle bacilli themselves, or from their toxins. As the first experiments with it were not very successful this mode of treatment fell into some disrepute. It has not, however, been given up. Very satisfactory results have been obtained by many practitioners, and much may be hoped from it in the future. This form of treatment can only be carried out under skilled supervision.

CHAPTER XV

THE NERVOUS SYSTEM

The Brain and its Membranes—Brain Weight—Cerebrum—Cerebellum—Medulla—Spinal Cord—Nerves—Action of the Nervous System—Sympathetic System

THE human nervous system is more complicated and more highly developed than that of the lower animals. Its duties are manifold, and include the control of all other organs of the body and of the relations of the individual to the external world. Its diseases are therefore more varied than those of any other system of the body.

The organs of the nervous system include the brain, the spinal cord, and the nerves.

The brain—the presiding genius of the whole system—is contained within the bony case of the skull, by which it is well protected from injury. The most vulnerable spot is probably that above the orbits or eye-sockets, the roof of which is formed of an exceedingly thin plate of bone. Many a fatal accident has occurred from pointed bodies being driven upwards through this weak spot.

The whole brain is enveloped by three membranes—the *dura mater* (next the bone), the *arachnoid*, and the *pia mater*. The *pia mater* lies over the whole surface of the brain and follows its folds; it carries the blood-vessels which supply the organ with its nourishment. The membranes contain a clear fluid—the cerebro-spinal fluid—which is chiefly collected at the under surface or base of the brain and acts as a water cushion, protecting the delicate nervous structures from jars and shocks. It also allows a variation of the amount of blood in the brain by being pressed in and out of the skull as the quantity of blood decreases or increases, a duty which is of much importance, as the bony skull is quite incapable of altering its capacity.

The average weight of the brain is about 49 or 49½ ounces in the male, and some 5 ounces less in the female.

Speaking generally, the weight of the brain corresponds with the degree of intelligence, and is, on the whole, greater in distinguished men than in others. The brain of Cuvier, the great **Brain Weight.** scientist, weighed 64 ounces; that of Dr. Abercrombie, the Scottish physician, was 63 ounces; while that of Turgenieff, the Russian novelist, weighed as much as 65 ounces. The brains of idiots, on the other hand, are usually much below the average weight, some

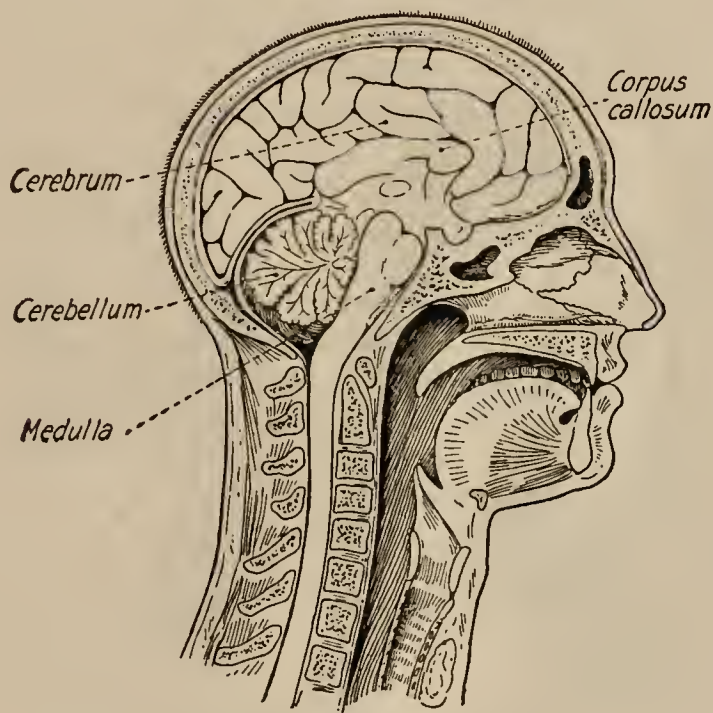


Fig. 36.—MEDIAN SECTION OF BRAIN.

weighing less than 16 ounces. Too much importance must not, however, be attached to the mere weight of the brain, for it is probable that more depends upon the quality than the quantity of the brain substance. But there is no doubt that those races which are most highly developed have the heaviest brains, and that Europeans have heavier brains than savage races.

The brain consists of three chief parts—the cerebrum, the cerebellum, and the medulla (Fig. 36).

The cerebrum, or great brain, fills the whole of the upper portion of the skull, and covers all the rest of the brain. It is divided, by a deep median cleft, which passes from front to back, into two equal parts, the cerebral hemispheres, and although these are separated on the

surface they are intimately connected together underneath by crossing bands of fibres, by which each hemisphere is brought into close relation with that on the other side. Their whole surface is everywhere folded in upon itself and thrown into numerous ridges and furrows (called convolutions and fissures), which appear to be arranged without any definite order. In this way the brain surface is enormously increased in extent. The cerebral hemispheres are the seat of the intellectual powers and of the will, and although these

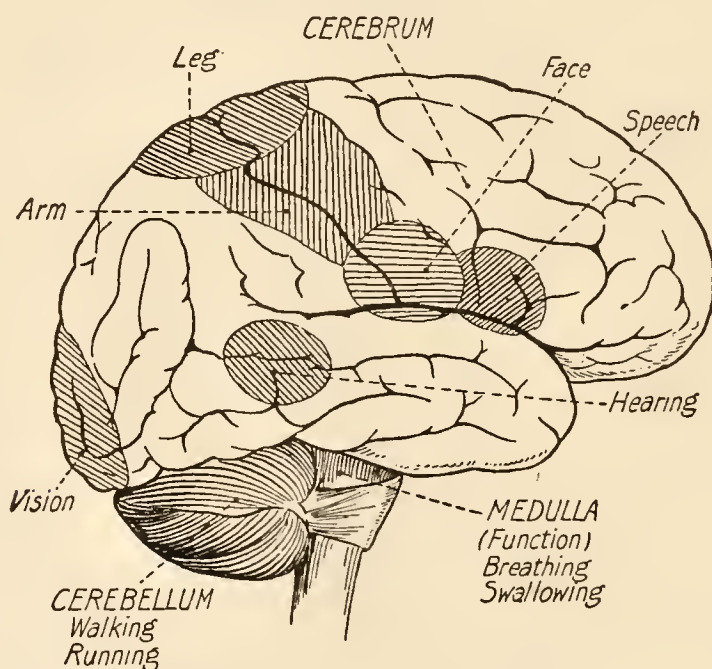


Fig. 37.—AREAS OF THE BRAIN.

faculties depend much upon the size and weight of the brain, they are to an even greater extent affected by the development and complexity of the convolutions. The cerebrum also originates all muscular movements, receives all impressions from the external world and interprets their significance. In 1870 the very interesting discovery was made that certain portions of the convolutions are set apart to preside over distinct duties (Fig. 37). One part, for instance, was found to originate and control the movements of the arm, another those of the leg, yet another the faculty of speech. This interesting discovery of the "localisation of function" was made as the result of experiments on the brains of animals. It was found that when certain definite spots of the brain surface were stimulated by an electric current, movements

were produced on the opposite side of the body. So accurate is the knowledge thus obtained that it is possible to recognise the exact situation in the brain of any disease. Destruction of a portion of brain causes loss of power in the muscles of the part under its control, and irritation of the same spot causes convulsions in those muscles. Tumours of the brain can now often be localised, and in some cases have been exposed by an operation and removed. There are centres for the special senses of sight, hearing, taste, smell, and touch, and in the frontal lobes are situated the higher mental faculties—a fact which explains the general belief that a well-developed forehead shows good mental power. These remarks might appear to support the claims of phrenologists, who profess to be able to discover a person's virtues and vices by examination of the head, but there is no foundation in science for these pretensions, for in the bones of the skull there are no alterations in shape corresponding with the convolutions.

The cerebellum, or little brain, is situated under the posterior portion of the cerebral hemispheres, and its duties are of quite a different order.

The Cerebellum. It controls and arranges the movements of the muscles, setting them in action at the proper time. It maintains the equilibrium of the body, and when diseased causes a staggering and uncertain gait, much like that of a drunken man.

The medulla lies below the cerebellum, and connects it with the spinal cord. In this part of the brain are situated some of the most important centres, whose duties include the supervision of the various processes which maintain life; it directs and maintains the movements of respiration, the action of the heart, the processes of digestion, and the supply of blood to all parts of the body. The slightest disease in this vital spot may mean instant death.

The Medulla. The interior of the brain contains several cavities, called the ventricles, which contain a small amount of cerebro-spinal fluid. If the communication between them be cut off, the fluid collects in and distends them enormously, and thus produces the disease known as "water on the brain." This cerebro-spinal fluid is useful in removing waste material from the brain, in maintaining a uniform pressure in the skull as this is altered by the varying amount of blood supplied to the brain, and in acting, as we have seen, as a water cushion to protect the brain from sudden shocks.

The spinal cord is attached to and continuous with the lower part of the brain or medulla, and extends from an opening in the base of the skull to the loins. It lies securely protected in a canal formed by

the bones of the spinal column, and is surrounded by a triple case of membranes corresponding with those of the brain. It is a somewhat flattened cylinder of whitish nerve substance, and on being cut is seen to consist of white and grey matter, the white forming the circumference and the grey the centre, the latter being arranged somewhat like the letter H (Fig. 38). Most of the substance of the cord is formed of nerve fibres, which are arranged in bundles, or columns as they are technically called. Its chief use is to transmit nervous impulses or messages in both directions, downwards from the brain to the body, and upwards from the body to the brain. It has also a sort of subordinate function to that of the brain in controlling the ordinary vital processes of the body.

The various columns of the cord are known by different names, and fulfil distinctive duties, but they are chiefly interesting for two reasons. Firstly, the various nerve messages travel in distinct columns; those from the brain downwards to the muscles, which make the muscles contract and move the limbs, pass along the front part of the cord. Those which pass from the skin and other parts upwards to the brain travel along the back part of the cord; they convey various sensations to the brain, such as pain, heat, or touch. The second matter of interest is that disease of different columns of the cord gives rise to different symptoms and represents several distinct affections, which will be further touched upon later.

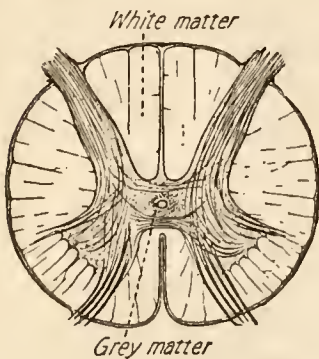


Fig. 38.—SECTION OF SPINAL CORD.

Throughout the whole length of the spinal cord the spinal nerves arise in pairs, 31 in number, and leave the spinal canal by small apertures between each of the vertebræ.

The nerves are cords formed of bundles of fibres, which transmit, like telegraph wires, the nervous impulses throughout the body. One set, which carry messages from the brain to the muscles in various parts of the body, are called *motor nerves*, or nerves of motion. The other set, which convey all messages from the body to the brain, such

The Nerves.

as pain, cold, heat, touch, etc., are called *sensory nerves*, or nerves of sensation.

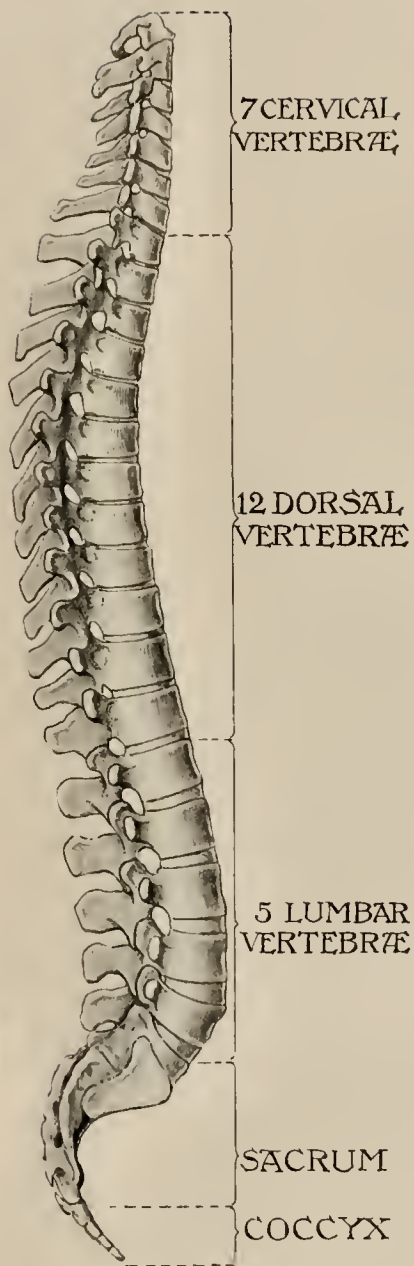
The true nature of nerve impulses, or nervous energy, is at present not understood, but it is apparently closely allied to electricity, and is accompanied by certain definite electrical changes in the nerve. The



BRAIN
AND
SPINAL CORD.



BACK AND SIDE VIEWS
OF SPINE.



THE BRAIN, SPINAL CORD AND BACKBONE.

force, whatever it may be, travels along the nerve at the rate of 100 feet per second.

The action of the nervous system can best be understood by regarding it as an elaborate electric telegraph system, and the nervous impulses as electrically transmitted messages. The brain represents the head office, the managing director, and the chief generating station of the electric current, while at various points in the body are local offices. Suppose the managing director sends an order to a local office to carry out some work—a movement of the hand, for instance—and we have an illustration of what is called “voluntary action,” in which the intellect originates a nervous impulse that passes down the motor nerves to some part and causes a definite and purposeful movement. Imagine, again, that a message is sent from the local office in the shin of the leg to the head office in the brain—that a kick has been experienced. This message is carried by the sensory nerve of the leg into the spinal cord at its lowest part, and passes up the columns of fibres in the posterior portion of the cord to the brain. At the head office it is interpreted as a call to lift the leg so as to relieve it of the weight of the body. A message is promptly despatched to the cerebellum, where a number of orders are issued, transmitted down the front of the spinal cord and along the motor nerves to the muscles which move the leg. But, in point of fact, it is not necessary for the brain to be troubled with such matters, for the requisite measures can be quite satisfactorily carried out by a subordinate office situated in the spinal cord, and would be so managed if the thinking part of the brain were asleep. This process is called reflex action. It requires an end organ to receive the impression, a sensory nerve to carry it to the cord, some nerve cells to receive the message and transmit orders, a motor nerve to carry them back, and a muscle to effect the requisite movement. If any of these are absent or act imperfectly, the reflex action fails to take place.

There is still another process, called automatic action, in which a nerve centre originates impulses spontaneously. In this way the heart is kept constantly beating, and the respiration continues at work even when the brain is at rest in sleep. One peculiarity of the course taken by nerve impulses is that they all cross the body from one side to the other, the left side of the brain ruling the right side of the body, and *vice versâ*. For this reason, if a hæmorrhage occurs in the right side of the brain, and some of the nerve cells are thus destroyed, the results are shown by loss of power or sensation on the left side of the body.

We must now describe the sympathetic system, which consists of a double chain of small swellings called ganglia, lying on either side of the front of the spinal column, and extending from the skull, through the chest and abdomen, to the pelvis. The ganglia are connected by nerve fibres with each other and with the spinal nerves; they give off many nerves which branch and interlace, forming networks or plexuses, and are distributed to all the internal organs and to the blood-vessels. One of the largest and most important of these networks is called the solar plexus; it is situated in the abdomen at the pit of the stomach, and sends branches to all the blood-vessels and organs within the abdomen. It is owing to this elaborate nerve supply that blows in this region are sometimes accompanied by dangerous shock. The sympathetic system is intimately connected with the cerebro-spinal system, but has perfectly distinctive duties to perform. It superintends all those processes which are carried on involuntarily, such as those of the heart, stomach, and intestines. It controls all the minute muscles in the walls of the blood-vessels, regulating the flow of blood, and so controlling the temperature of the body. It also superintends the process of digestion and the secretions of the various glands.

**The
Sympathetic
System.**

CHAPTER XVI

DISORDERS OF THE NERVES

Neuralgia—Tic-douloureux—Sciatica—Intercostal Neuralgia—Neuritis—Paralysis of the Face.

NEURALGIA

Is a term applied to pain of a purely nervous origin which is unaccompanied by any structural alteration in the affected nerves. It may involve internal organs as well as external parts, and may occur in the stomach, heart, kidney, and ovary. In neuralgia of the kidney the symptoms may closely simulate those of renal colic, and neuralgia of the heart forms one of the varieties of angina pectoris. Of external neuralgias, some of the most familiar are "tic," or "tic-douloureux," affecting the nerves of the face; sciatica, involving the large sciatic nerve in the thigh; and intercostal neuralgia, or pleurodynia, in which the nerves of the spaces between the ribs are affected. There are a very large number of conditions which produce neuralgia, either by affecting the nerve itself or by acting indirectly upon the general health.

Neuralgia is most commonly met with in those who come of a nervous stock, and whose parents have either suffered from neuralgia itself or from other nervous troubles. It is much more common in women than in men, but seldom attacks children. Debility is a strong predisposing cause of neuralgia, and anæmia is frequently associated with it. The state of the blood produced by rheumatism, gout, lead poisoning, and diabetes engenders a strong liability to attack, as also does the debility of severe illness, especially that left by an attack of influenza. The malaria poison often sets up a very troublesome form of the complaint, which has a special tendency to return at regular intervals, and one form of neuralgia of the face has received the name of "brow ague."

In those predisposed in any of these ways it requires but the slightest exciting cause to bring on an attack. Exposure to cold and

wet, a draught of cold air, an east wind are the commonest ways by which it is produced, but fatigue, strong emotions, and the abuse of tea, coffee, tobacco, and alcohol are also to be reckoned as efficient causes. The actual nerve affected often depends upon some local condition, as a wound or bruise of a nerve, or decayed teeth. A very common form of neuralgic headache is produced by eye strain due to some imperfection of the sight, and it quite disappears when relief is obtained by the use of proper spectacles. In this connection it is a fact of some interest that pain may be produced, by reflection, in other branches of a nerve which are quite free from irritation. For instance, a diseased tooth may set up a neuralgia in the brow or at the back of the head. Severe neuralgic pain occurs in many diseases in which some actual change takes place in the structure of the nerve, the most common being inflammation (*see Neuritis*, p. 323).

The pain characteristic of this affection is not continuous, but comes on in attacks or paroxysms, sometimes very suddenly, at others being preceded by uneasy sensations or tingling in the part. It varies in intensity, at times being a dull ache, at others a sharp darting or shooting, which is almost unendurable. The paroxysms may be short, lasting but a few seconds, or they may extend over hours, or even days, at one time almost fading away, but returning with renewed violence.

The course and duration of the disease is most indefinite. The attacks may recur at intervals of a few seconds only, or they may take place daily or on alternate days, or at long intervals. Those neuralgias which owe their origin to malaria are particularly liable to recur at regular and definite intervals. When the attacks subside they leave behind a bruised, aching sensation, often accompanied by a distinct numbness.

When a case is much prolonged it is not uncommon for certain "tender points" to develop along the course of the nerve, generally at the spots where the nerve passes out of a bony canal, or where it runs from a deep to a more superficial position. These spots are extremely painful when touched.

Tic-douloureux, or facial neuralgia, is the most severe form of the disease. It comes on in adult life, is most difficult to cure, may last for years, and makes life so hard to bear that even suicide has been attempted to escape the intense suffering. It may be brought on by any of the causes of neuralgia, but in many

Exciting Causes.

Symptoms.

Facial Neuralgia.

cases its origin is quite unrecognisable. The nerves affected are the various branches supplied to the side of the face and jaws, and the pain may shift from one to the other or involve all of them at the same time. The symptoms vary accordingly: sometimes the eye becomes watery, painful, and bloodshot; at others the teeth are exceedingly tender, and the movements of eating or speaking greatly aggravate the pain. If the nerves of the scalp are affected the hair may fall out, or a patch of white hair may form and the skin become wasted and altered in appearance, with an eruption of small blisters (vesicles), the last forming the eruption of herpes. A breath of cold air, a loud noise, or sometimes nothing at all brings on an attack with absolute suddenness, like an electric shock. The patient jumps up in agony, rushes about the room, or sits pressing his hand against his cheek or rubbing it with his hand, or with a pad which he carries for the purpose, with all his might, and after a time may rub all the hair off the affected part. Sometimes he works his lips or chews, as if he could by such movements relieve the pain.

Sciatica is a pain in the parts supplied by the sciatic nerve, which passes down the back of the thigh and supplies with sensation that region, the knee, the front, back, and outside of the leg, and the whole foot except its inner border. The affection may be due to neuritis, and is commonly associated with the rheumatic poison, or it may be purely neuralgic in origin. The latter form is a most obstinate complaint. It commonly arises from exposure to wet and cold, as lying on damp grass when heated, or sitting on a cold stone, and is sometimes induced by over-exertion. The affected parts are tender all over, and certain spots are excessively so. Any movement of the limb increases the pain, and the protracted rest it entails, together with the condition of the nerve itself, often leaves the limb in a wasted and flabby condition, which may take a long time entirely to disappear.

Intercostal neuralgia is of frequent occurrence, especially in anæmic and nervous women. It more often affects the left side, in the spaces between the sixth and ninth ribs. The pain is very severe, occurs in paroxysms, and is much increased by any movements of the part, such as taking a deep breath, sneezing, or coughing. It often forms the first stage of an attack of shingles, the pain preceding the eruption of a crop of small blisters by a few days, and continuing sometimes for months after they have entirely disappeared. In nervous people intercostal neuralgia is liable to be

**Intercostal
Neuralgia.**

accompanied by palpitation of the heart, and much alarm arises from the fear of disease of that organ. The pain is, however, in the chest wall, and not in the heart. The rheumatic affection also called pleurodynia (p. 19), in which the muscles are tender and cause severe pain on movement, may be confused with this form of neuralgia; but one point of distinction is that the neuralgic pain may continue even during rest. A suspicion of pleurisy also arises, for some difficulty in breathing occurs in both complaints, but fever is absent in neuralgia, though usually present in pleurisy.

To cure cases of neuralgia it is of great importance to do all in our power to improve the general health. Good diet must be insisted upon. It should be abundant and nourishing, and should include a fair allowance of meat, bread, eggs, and milk. Above all, it must consist of a large proportion of fatty substances, such as butter and cod-liver oil. Good hygiene, too, must receive particular attention. The patient must take a moderate amount of regular and systematic exercise, which should stop short of fatigue. A good portion of the day should be spent in the open air, and close, badly ventilated rooms must be sedulously avoided, whether by day or by night. A sufficient amount of sleep is essential, especially for the young, and as far as possible freedom from worry, anxiety, and mental overstrain should be obtained. If these conditions cannot be secured at home, then a change to some healthy, bracing place, preferably not the seaside, must be prescribed. Knowing the usual exciting causes, the patient must dress warmly, wearing woollen clothing, and must be particularly careful not to expose himself to damp, cold, and climatic changes.

All forms of local irritation must be removed, such as decayed teeth, imperfect sight, or constipation. The constitutional causes should receive the treatment elsewhere recommended for anæmia, rheumatism, gout, and malaria.

One of the best remedies for neuralgia is quinine. In all cases in which there is any suspicion of ague, or when the patient is residing in a district where ague is prevalent, it is advisable to try this remedy. It is also indicated when the attacks come on at regular intervals, or when the pain is chiefly experienced at a spot just above one or other eyebrow (brow ague). It should be taken in fairly large doses—5 grains, twice a day, in the form of pills or cachets.

Phosphorus is a valuable remedy in all forms of neuralgia, especially in aged persons. It may be taken in one of many forms, 15 or 20 drops

of the elixir in water thrice a day after food; phosphorated ether in 5-drop doses, on sugar or in a little milk, may be taken when the attack comes on, and repeated as required every three or four hours; phosphorated oil, 1 to 5 drops on sugar or in capsules, every three hours, or the compound syrup of the hypophosphites in half-teaspoonful doses three times a day after food.

Arsenic proves beneficial in some cases; 3 drops of the solution should be taken in water three times a day after meals. Chloride of ammonium may also be given a trial in 5- to 10-grain doses with water, and with 30 drops of liquid extract of liquorice added to each dose to disguise its nauseous taste. Exalgin 1 grain, antipyrin 5 grains, antifebrin 3 grains, ammonol 5 grains, antikamnia, antikamnia and codeia, phenalgin 5 grains, phenacetin 4 grains, with caffeine, are all found useful in neuralgia. They can be obtained in tablets, but must all be used with caution.

In neuralgia of the face, especially that form which is due to decayed teeth, there are two drugs which are found to be most efficacious. One is butyl-chloral-hydrate, and the other gelsemium. The dose of the former is 5 grains, and it may be taken as a pill or made into a mixture with glycerine (20 drops) and water (to 1 ounce), and taken every two hours for three or four doses. Some "neuralgic pills" contain the two drugs in combination, and are very beneficial. Gelsemium is taken in the form of a tincture, 15 drops every four or six hours; it is often combined with 15 grains of bromide of ammonium. The decayed teeth should, of course, be removed.

Solution of strychnia in 3- to 5-drop doses is useful in neuralgia of the stomach, and tincture of belladonna, 10 drops three times a day, when the pain affects the pelvic organs, and especially the ovary. Tonga is a specialty for neuralgia used by the natives of the Fiji Islands. It is a fluid extract of certain plants, and its dose is from one to two teaspoonfuls in water three times a day. In Brazil guarana is used as a substitute for cocoa, and a small teaspoonful of it stirred up in a cupful of sweetened water is found to give relief in neuralgic headache. It contains a large quantity of caffeine, and it is probably this principle that makes tea so useful a remedy in neuralgia. Both black and green tea are serviceable, especially the latter, and it should be taken strong and hot.

Last, but not least, in our long list of remedies for internal employment comes morphia. By a hypodermic injection of this drug every case of neuralgia, however severe, can be relieved with certainty for a

certain time, but it does not cure the complaint. The pain returns, and the morphia has to be repeated, probably in a larger dose, and great danger arises of establishing a habit. Morphia is therefore double-edged, and must only be used as an emergency drug and under the advice of a doctor.

There are many local applications which are used for the relief of the pains of neuralgia. Aconite causes numbness and tingling, and often relieves pain. A piece of freshly prepared aconite ointment, the size of a bean, may be gently rubbed into the painful spot, care being taken not to apply it where the skin is broken, or to mucous membranes. Aconite liniment also may be painted with a brush along the affected nerve. Belladonna liniment or chloroform liniment can be used in the same way, and, perhaps better still, a mixture of equal quantities of the three, called the A B C liniment. Chloroform may be applied pure, soaked on a piece of linen and covered with oil-silk, or in a liniment thus: Chloroform 1 part, tincture of opium 1 part, and liniment of belladonna 4 parts.

Menthol is another valuable local sedative. It is made into cones, sticks, and pencils, to be rubbed on the painful spot, and imparts a sensation of cold and numbness. It can be combined with other drugs in liquid form to form paints to be applied with a brush; for instance, menthol 3 parts, chloroform 4 parts, and olive oil 9 parts; or menthol 6 parts, purified ether 4 parts, and chloroform 4 parts. Veratrina ointment may have a trial; it is especially useful in sciatica, but is liable to produce a rash. Oleate of morphia often succeeds admirably as an external application. Freezing with ether spray may also be recommended.

Counter-irritation is sometimes useful, either by hot poultices, mustard leaves, or blisters. To produce a blister, paint blistering fluid over a spot about the size of a florin at the seat of greatest pain, and repeat the application in two days close to, but not on, the same place. Galvanism has cured many most obstinate cases, and high-frequency currents have been applied with some success. Radium combined with oxide of thorium, applied over the affected spot, has been recommended as an active curative agent. But these last-mentioned applications require skilled assistance and special apparatus.

In the most severe and intractable cases it may be necessary to call in surgical aid. The operations of stretching the nerve, puncturing it with a needle, or removing a portion of it, have sometimes been followed by permanent cure.

The extreme difficulty of obtaining relief from this malady can be well seen from the lengthy list of drugs recommended and the heroic measures that may be found necessary.

NEURITIS

Neuritis, or inflammation of a nerve, is not an uncommon complaint. Although the term is often used as synonymous with neuralgia, this is inaccurate, for neuralgia, as a rule, occurs without any inflammation. Many cases of neuritis are met with in which the cause is very obscure, but usually some definite though slight exciting cause can be traced, such as the exposure of the part to a draught or to cold, or to some bruise, strain, or other slight injury. These otherwise unimportant conditions are particularly liable to start a neuritis in persons who are subjects of rheumatic or gouty tendencies, or of syphilis. Some of the most common examples of neuritis produced in this way are facial palsy and sciatica. Neuritis also is present in some, if not all, cases of "shingles," in which disease very severe pain of a neuralgic character accompanies the appearance of an eruption of small blisters. In these affections only a single nerve is involved, but it is not uncommon for neuritis to occur in many nerves at the same time. This may be caused by the action of some poison, such as alcohol, lead, or arsenic, or by some general disease, such as influenza, diphtheria, malaria, or diabetes. In all cases it is the sheath of the nerve which is inflamed. This becomes swollen, and presses upon and irritates the delicate nerve fibres, producing the symptoms of neuritis and interfering with the carrying out of the proper duties of the nerve.

The symptoms vary according to the nerve affected. If it is a sensory nerve they include acute neuralgic pains, with numbness and tingling and tenderness along the course of the nerve. If a motor nerve is inflamed there will be twitchings of the muscles which are supplied by the nerve, followed by loss of power or partial paralysis.

The treatment depends upon the cause, and must be both constitutional and local. If the attack can be attributed to rheumatism, salicylate of soda and alkalies should be taken; if to gout, colchicum and iodide of potash; if to syphilis, mercury and iodide of potash. The local treatment at first consists of counter-irritation with small blisters or with fomentations or poultices, and of complete rest. The pain may be sufficiently severe to require some sedative. The paralysis or numbness must be treated, after the

inflammation begins to subside, by massage, sedative liniments, and electricity.

PARALYSIS OF THE FACE

Facial paralysis—or Bell's palsy, as it is called, after the surgeon who described it—is an affection of the nerve of the face. The causes

Causes.

vary according to the part of the nerve involved. The affection may be caused by disease of the brain at the origin of the nerve, and the condition is then very serious. Or it may be due to inflammation of the nerve itself, when it is far less important. The nerve, in its course from the brain, traverses a channel in the bones of the skull, passes very close to the middle ear, from which it is separated by a thin layer of bone, and spreads out on the side of the face from a point just in front of the ear. Inflammation of the nerve is not seldom set up by spread of inflammation from the middle ear, a complication which is not uncommon in children. The most frequent cause, however, is exposure to cold of the nerve at the side of the face. The inflammation thus set up causes swelling of the nerve inside the bony channel, and gives rise to the symptoms.

These consist in a loss of power of all the muscles on the same side of the face, which is devoid of all expression. The skin is smooth, all

Symptoms.

wrinkles being effaced; the eye cannot be closed, and waters; the corner of the mouth droops, and cannot retain fluids when drinking. The face is drawn to the opposite side, and the patient can neither laugh nor frown on the affected side of his face. All this trouble may come on within twenty-four hours of the exposure to cold.

As it is of importance to distinguish the severe forms from the less important, it is well to know the chief points of distinction. In the severe forms the eye can usually be shut and the forehead raised, and there are signs of loss of power in other parts of the body.

Paralysis due to cold usually disappears in two or three weeks, although in some cases a slight loss of power may continue for months.

The treatment should be commenced as soon as possible, for much harm results from delay, and a neglected attack will probably be a prolonged one. Poultices and fomentations should be

Treatment. applied to the side of the face and behind the ear, and much benefit is sometimes obtained by the use of a few leeches. In the later stages counter-irritation should be employed, either by blisters or iodine liniment, or gentle friction with some stimulating embroca-

tion. The application of electricity to the muscles prevents the great tendency to waste which is so marked a symptom in a prolonged attack, and maintains their nutrition and tone during the gradual recovery of the nerve. It should be applied by a skilled hand, and may be in the form either of faradism or of galvanism. It is said that the first of the muscles to recover are those that enable the patient to smile.

In the early stage the following mixture is useful :—

PRESCRIPTION 113

Salicylate of soda	. . . .	80 grains.
Bicarbonate of potash .	. . . .	2 drachms.
Syrup of orange .	. . . .	$\frac{1}{2}$ ounce.
Water to 8 ounces.		

An eighth part to be taken every 4 hours

After a few days small doses of iodide of potash may be employed, 2 or 3 grains being taken in a tablespoonful of water three times a day. In the later stages tonics should be taken to improve the general health and the tone of the affected muscles.

CHAPTER XVII

DISORDERS OF THE SPINAL CORD AND BRAIN

Sclerosis of the Spinal Cord—Paralysis Agitans—Locomotor Ataxy—Loss of Muscular Power—Loss of Sensation—Trembling, Convulsions, Spasms—Vertigo—Loss of Consciousness—Delirium—Illusions—Idiocy—Melancholia—Mania—Monomania—Dementia—General Paralysis of the Insane—Catalepsy, Ecstasy, Reverie, Trance—Somnambulism—Sleeplessness—Neurasthenia—Hysteria—Hypochondriasis.

WHEN describing the anatomy of the spinal cord we explained that it was divided into certain columns or tracts, and referred more

General Considerations. particularly to two of these, one in the front of the cord, called the motor tract, along which nerve impulses pass to the muscles to produce movements of parts of the body, and the other in the back of the cord, called the

sensory tract, along which impulses pass from the organs of sensation in the skin and elsewhere to the brain. There are, besides these, many other definite tracts or regions, with the names of which it is not necessary to burden our memories. But they are interesting in connection with diseases of the spinal cord and brain. It has been observed, for example, that if a portion of the brain substance be destroyed by hæmorrhage into it, or in any other way, a process of degeneration is set up which gradually spreads downwards from the diseased spot into and along the spinal cord, and that this process is limited to the motor tract and seldom spreads laterally from it. If the disease affects the lower part of the cord the degeneration which is induced passes upwards along the cord to the brain, and is confined to the sensory tract; whilst if the disease originates in the middle portion of the spinal cord, the degeneration spreads in both directions, upwards in the sensory tract to the brain, and downwards in the motor tract.

SCLEROSIS OF THE SPINAL CORD

There are many different diseases of the spinal cord, most of which are the result of a chronic inflammatory condition of the cord, to which

the name of sclerosis (a hardening) is applied. In some diseases the sclerosis affects the grey matter at the *front* of the cord (Fig. 39)—for example, in infantile paralysis (to be dealt with elsewhere), in a similar disease occurring in adults, and in progressive muscular atrophy. The functions of this part of the cord are to carry motor impulses and to control the nutrition of the muscles, and when it is diseased paralysis and rapid wasting of the muscles follow, and these are the chief symptoms of the three diseases we have mentioned.

When sclerosis occurs in the white matter at the *sides* of the cord (Fig. 39), the disease is called lateral sclerosis, and its chief symptoms are paralysis of the limbs with rigidity and contraction of the muscles, but without any marked wasting.

Sclerosis of the white matter at the *back* of the cord produces the disease called locomotor ataxy, the chief symptom of which is loss of control over the muscles (p. 328).

Sclerosis sometimes occurs in the *medulla*, from which the nerves arise that supply the tongue, lips, and larynx. The symptoms caused by it are gradually developing paralysis of those parts, and the disease is called glosso-labio-laryngeal palsy.

Lastly, scattered patches of sclerosis may be distributed irregularly throughout the nervous organs. This is called disseminated sclerosis, and the chief symptoms are tremblings of many parts when their muscles are being exerted, with gradually increasing paralysis and loss of mental power.

PARALYSIS AGITANS

Or shaking palsy, is an affection met with in persons of advanced age, in which constant trembling occurs in the muscles of the limbs. Its causes are unknown, but some cases are brought on by violent emotion, such as terror, grief, or anger. It is said to be produced by prolonged exposure to cold and wet. The disease may continue for many years, and little benefit is obtained by treatment. Iron tonics are useful, and some relief may be obtained by the application of electricity. The patient should be placed in as healthy surroundings as possible, and should have good food and plenty of sleep.

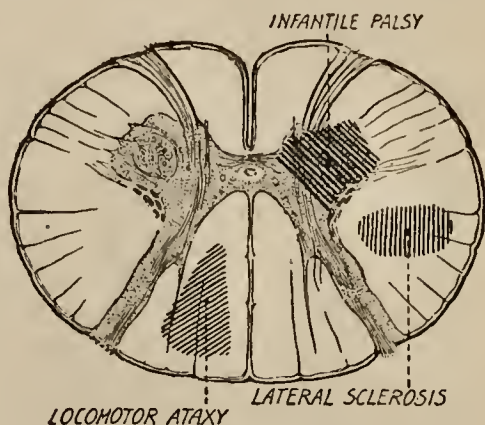


Fig. 39.—LOCALISATION OF DISEASES OF THE SPINAL CORD.

LOCOMOTOR ATAXY

Or tabes dorsalis, is a disease of the spinal cord which comes on very insidiously, continues gradually to grow worse, and lasts for many

Symptoms. years. The symptoms include severe shooting or "lightning" pains in various parts of the body, a loss of control over the muscles, especially those of the legs, and inability to stand erect with the eyes shut or in the dark. The patient's walk is most peculiar: he lifts his feet much higher than is necessary, throwing his foot forward and bringing it down on the ground with unnecessary force. He can take long walks with comparatively little fatigue, in spite of the excessive violence of his movements. The intellect remains quite unaffected. Gradually but surely the disease progresses, many other symptoms develop, with increasing helplessness, and finally death supervenes, generally as the result of some other disease.

Treatment is not of much avail. The patient should avoid over-exertion, take plenty of rest, should not expose himself to cold and wet, should eat judiciously, and keep good hours. Medicines
Treatment. are useful chiefly to relieve symptoms, and have little effect on the progress of the disease. The most hopeful cases are those which can be definitely traced to syphilis, in which mercury and iodide of potash may sometimes lead to recovery.

LOSS OF MUSCULAR POWER

Paralysis is the term used to signify the loss of power in the muscles to produce movements, in contradistinction to anæsthesia, which means loss of sensation. Paralysis is due to some affection of the nervous system, and when the loss of power is simply consequent upon the avoidance of pain, as in the helplessness of an inflamed joint or a rheumatic limb, it is not correct to call it paralysis. The word "palsy" is used as synonymous with paralysis, and the popular idea that it implies trembling as well as loss of power is erroneous. In our description of the action of the nervous system we likened it to an electric telegraph system, and with this idea in our minds it is easy to understand in how many ways paralysis may be produced, for anything which interferes with the rapid transmission of messages from the brain to the muscles will give rise to this symptom.

Something may be wrong at the head office—the brain—and no messages may be sent out, or a fault may exist in the telegraph wires—the spinal cord and nerves—and messages may be cut off. In this way

we may divide paralysis into three different classes, according to the situation of the cause, namely, paralysis of the brain, the spinal cord, and the nerves.

Of brain paralyses, one affects the body generally; it occurs in connection with insanity, is due to a widespread impairment of the surface of the brain, and is known as general paralysis of the insane. But the great majority of brain paralyses are only on one side; one side of the brain is diseased and the other side of the body is paralysed. This crossing of the paralysis is due to the fact that the right side of the brain, as we have seen, controls the left side of the body, and *vice versâ*, and that all messages cross over in the nerve structures before they reach the muscles. This variety of paralysis is called hemiplegia (a half stroke), and in it there is loss of power in the arm, leg, face, and tongue on one side of the body. The muscles, however, which carry out the processes of swallowing, breathing, and speaking are unaffected. But in connection with speech there is an exception of great interest, for if the disease of the brain is on the left side and rather near the front, speech is entirely lost, for the special centre of speech is then affected. Right-sided disease never has this result.

The most common cause of hemiplegia is apoplexy, or hæmorrhage into the brain from the rupture of one of its arteries (p. 353). This is what is popularly known as “a stroke” of paralysis, but very similar symptoms are produced by the blocking of one of the brain arteries by a clot, and the cutting off of the blood supply to a portion of brain substance. According to the part of the cerebral hemisphere affected, the paralysis may or may not be accompanied with loss of sensation in the same parts. The effects of a “stroke” very rarely entirely disappear, but leave the patient maimed, with an arm and leg much impaired. Some improvement, however, may occur, and it is usually the leg that is the last to fail and the first to recover power.

Another form of paralysis occurs when the part of the brain called the medulla, or “the bulb,” is involved by disease. It is here that many of the nervous messages cross from one side to the other, and so there may be “crossed” paralysis—that is, paralysis affecting one side of the body and the opposite side of the face. As swallowing, respiration, and the heart’s action are controlled by this part of the brain, great dangers arise.

When the spinal cord is the seat of disease the paralysis affects all the lower part of the body; it has received the name of paraplegia. It

is often caused by fracture of the spine. All power is lost in both legs and in the bladder and bowel, and usually sensation also is lost

Paralysis of the Spinal Cord: in the same parts. There is a marked tendency to the formation of bed-sores, and a very rapid wasting of all the paralysed muscles, owing to an interference with the nerves of nutrition.

Paraplegia. Sometimes the disease does not involve the whole thickness of the cord, but only the nerve cells of the grey matter. The symptoms then produced are loss of power and wasting of certain muscles. This is the disease that causes infantile paralysis and the similar condition in adults, as well as progressive muscular atrophy.

Localised paralysis is caused by disease of the nerves, and only affects the muscles to which the affected nerves are supplied. It is

Localised Paralysis. caused by cold, injury, or the action of such poisons as lead and alcohol. Facial paralysis is an example of that produced by cold, wrist-drop of that caused by lead, and crutch paralysis of that produced by injury. This last forms one variety of "pressure palsy"; another example is that familiarly known as "the foot going to sleep," caused by the pressure of a chair on the sciatic nerve at the back of the thigh.

Lastly, a strange form of paralysis is met with in hysteria, in which disease almost any part and any muscle may be affected without evident alteration in structure of the nervous system.

The condition of paralysed muscles varies considerably. In some cases they are contracted and tight, in others loose and flabby. They may also lose contractility to all forms of electric current. In some cases the paralysed muscles waste much more rapidly than their want of use will explain, and this is found to occur in a very marked degree in the paralysis caused by disease of the nerves. In these it is of great importance to maintain the nutrition of the muscles by the use of massage and electricity until the affected nerves have had time to recover.

LOSS OF SENSATION

This symptom (anæsthesia) may affect the same parts and be produced in the same way as described in connection with paralysis, but the cause acts on the sensory part of the brain or spinal cord instead of on the motor. It may affect the whole or only a part of the body, and may vary very much in degree. It may be simply a sensation of tingling or numbness, the parts feeling as if covered with

some soft texture, or it may be absolute insensibility, in which the parts may be pricked, cut, or burnt without the knowledge of the patient. The perception of pain being absent, injury may be done without the patient being aware of it; bed-sores may form from friction, pressure, or irritation, or the skin may be burnt by uncovered hot bottles. In the pressure palsies we have mentioned there is loss of sensation as well as loss of motion, for the nerves whose action is affected by the pressure are mixed nerves, and contain both motor and sensory fibres. Anæsthesia can be produced by the action of drugs—hence called anæsthetics—such as ether, chloroform, laughing gas, and many others. These affect the body generally, but a local loss of sensation can be produced by such agents as cocaine, menthol, and aconite, and by freezing the part with the intense cold of an ether spray. The opposite condition of excessive sensibility is called hyperæsthesia.

TREMBLING, CONVULSIONS, SPASMS (CRAMP)

These conditions are all due to the contraction of muscular fibres. Trembling, or tremor, may occur in states of emotional excitement and in nervous debility; is generally worse during any **Trembling.** effort at voluntary movement, and ceases during sleep. It is one of the troubles of old age, and is a symptom produced by many poisons, such as mercury, and by alcohol, tea, and tobacco, which cause it when indulged in to excess. Many nervous diseases are accompanied by trembling, especially paralysis agitans, or the shaking palsy. Familiar instances of tremors are the vibrations of the eyelid called “live blood,” caused by rapid contractions of the small muscular fibres, and the trembling of the whole body when shivering from cold. Tremor is a symptom of many diseases, but is seldom an important one, so that it is not necessary to mention them.

The treatment depends on the cause, and must be directed to its removal. When the trembling is produced by debility, benefit will be obtained from tonic medicines, good food, and a quiet, regular life, with freedom from worry and excitement.

Convulsions are muscular movements which are much more violent than tremblings, and which take place independently of the will. If **Convulsions.** the contractions are intermittent—that is, if contraction and relaxation alternate—they are said to be clonic, and if they are persistent and continuous they are tonic. Clonic convulsions are seen in epilepsy, and tonic in lockjaw and in poisoning

by strychnia. During a convulsion the patient is usually unconscious. Convulsions are produced by some form of irritation of the nervous system, either acting on it indirectly, as in teething, indigestion, and worms, or directly through the medium of the blood, as in poisoning and acute feverish disease. Many affections of the brain and nervous system are accompanied by this symptom.

The treatment is, first, to detect the cause. We will here consider only the treatment of convulsions of adults, as we elsewhere describe their management in children. Our first inquiries must be directed to discover whether the patient has had an accident and received a severe brain injury, for if this is not the case there are only two diseases which can be the cause—epilepsy and hysteria. It is true that convulsions in adults also occur in uræmia, in lockjaw, in hydrophobia, and in strychnia poisoning, but they are then accompanied by other definite indications.

If an apparently healthy adult is attacked with convulsions apart from an injury, we shall be hardly likely to err if we consider them as due to epilepsy if the patient is a man, and to either epilepsy or hysteria if the patient is a woman. The distinction between epilepsy and hysteria will be explained elsewhere.

Spasms are continuous or tonic contractions of muscles, and are sometimes called "cramp." They may affect particular organs or

Cramp. single muscles. Examples are the contractions of the intestines which cause the intense pain of colic; of the bronchial tubes in cases of asthma; of the opening of the windpipe in spasmodic croup; of the diaphragm, producing hiccough; of the muscles of the neck in "wry neck"; of the muscles of the hand in writer's cramp, and of the muscles of the calf or other parts of the body.

"Cramp" is due to a muscular contraction which is quite involuntary, though the affected muscle is usually a voluntary muscle. It is an exceedingly painful affection, but quite devoid of danger. Any muscle may be implicated, but those most commonly affected are the calf muscles or those of the feet. Its chief causes are exposure to cold, or over fatigue, and those most liable to attack are the gouty. It comes on principally at night, when the limb is moved or stretched, and the muscle can then be felt to be tightly contracted and excessively hard. To stop the pain it is necessary to put the muscle on the stretch; when the cramp is in the calf this is done by straightening the knee and bending the foot up towards the shin. Rubbing the part

firmly also often gives relief. General treatment should be directed to removing the gouty condition or neutralising any irritation of the digestive organs. In olden days there was much faith placed in what were called "cramp rings," which were supposed to cure cramp and "falling sickness." The original ring was given by a pilgrim to Edward the Confessor, and was afterwards preserved as a relic in Westminster Abbey. The belief was that rings blessed by English sovereigns were efficacious in these diseases, and it was not until the time of Queen Mary the First that the custom died out of distributing "cramp rings" on Good Friday.

Swimmer's cramp is liable to attack anyone plunging into cold water for a swim, but especially those who are out of health or out of practice in swimming. There is particular liability to it in those who have weak hearts or who have recently partaken of a heavy meal. This complaint is credited with the many deaths that occur amongst good swimmers, and yet one can hardly believe that ordinary cramp would so paralyse a practised swimmer as to cause his death. The person affected is seen to throw up his arms, perhaps cries out, and then sinks, only to rise again when all hope of recovery is past. The most probable explanation, derived from the experiences of those who have narrowly escaped such a fate, is that the cold and violent exertion produce a spasm of the arteries, by which the circulation is seriously interfered with and heart failure produced. The proper treatment is warmth, rapid friction of the body, and stimulants. If the breathing has ceased, resort must be had to artificial respiration.

Cramp, or spasm of muscles, is the cause of a most interesting class of affections which are known collectively as "trade spasms." In these the excessive or long-continued use of certain muscles is followed by a condition of most distressing and painful spasm of the muscles whenever they are used for that special purpose, but only when used for that purpose; for all other movements, even the most delicate, can be performed without giving rise to any trouble. Writer's cramp and wry neck are the most common of these affections; but a tailor may find it impossible to hold his needle, a fencer to take up the position of defence, a turner to use his lathe, a pianist to strike the right chords, a violinist to hold his violin, and so forth.

Writer's cramp occurs chiefly in clerks and others who are obliged to write for many hours a day. The affected person suffers from

severe aching pains in the hand after writing, later from unsteadiness, and finally from an absolute inability to hold the pen. The fingers

can be used with perfect ease for any other purpose.

Writer's Cramp. After a time, if rest is not taken, the muscular spasms

spread to other parts, such as the shoulders and neck.

The trouble is due to an exhaustion of the nervous structures that preside over the movements of writing, and is said to be caused by a faulty method of writing.

Treatment includes absolute cessation of this particular use of the affected part. Some persons learn to write with the left hand, but this also may after a time be affected. The use of a typewriter is the best remedy, this movement of the fingers being quite distinct from that of writing. Galvanism, massage, and systematic rhythmical exercises of the affected parts often bring about a cure. Friction with liniments and hot water douches are also beneficial, and, as the general health is often impaired, tonics should be employed.

Wry neck is a form of cramp due to spasm of the muscles on one side of the neck; another form has been described as due to rheumatism,

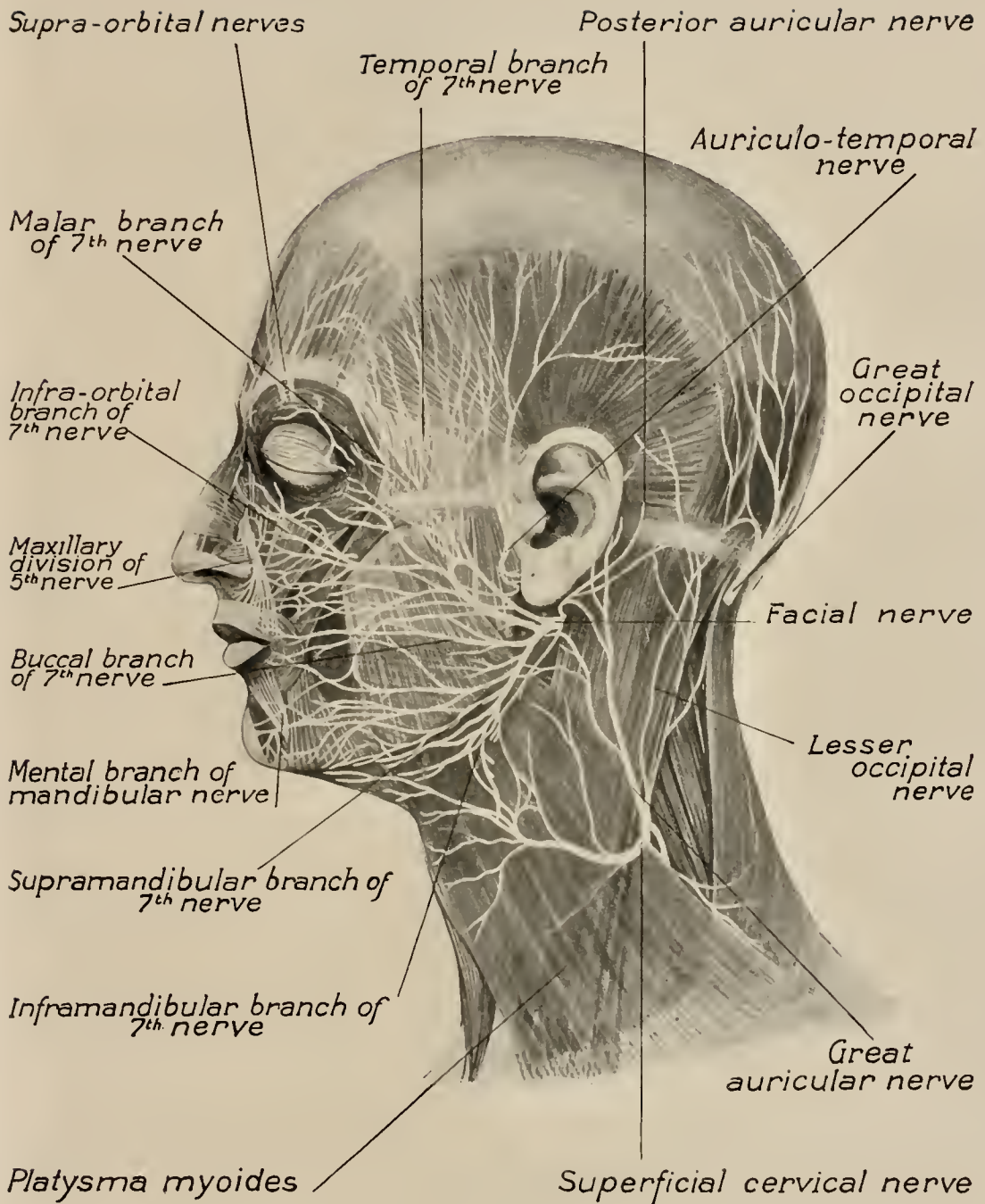
Wry Neck. under the name of stiff neck (*see* p. 20). It is a disease

of middle age. The back of the head is drawn down and towards the affected side, whilst the chin is raised, and the face turned towards the other side. In other cases the spasm comes on in jerking movements of the head, which may recur every minute or two. They are made worse by the presence of strangers, by excitement or fatigue, but entirely cease during sleep.

The treatment is not very satisfactory, for though relief may be obtained the trouble is very liable to return. Galvanism may be employed, and sedatives for the nervous system, but the case should be in the hands of a doctor. Sometimes the affection can be benefited by operation.

VERTIGO

Giddiness, or vertigo, is a common symptom in nervous diseases, but it also occurs in many unimportant conditions. It varies in degree from a mere "swimming in the head," such as is felt on board ship, to a condition in which it is impossible for the sufferer to maintain the erect position without clinging for support to surrounding objects. It is produced by anything which causes a deficient supply of healthy blood to the brain, and therefore is common in anæmia, in great loss of blood, and in fainting. The dizziness experienced on rising from



SUPERFICIAL NERVES OF THE HEAD AND NECK

a stooping position is also dependent upon the circulation through the brain. Derangement of the stomach and liver may be accompanied by giddiness, and the condition is then usually referred to "biliousness." Some affections of the eyes produce this symptom, and it is because of the effect on the eyes that turning round rapidly causes giddiness. But it is much more commonly connected with diseases of the ear, such as inflammation of the middle ear, or an accumulation of wax in the external canal. The semicircular canals which form part of the complicated structure of the internal ear are of great importance in maintaining the equilibrium of the body, and disease affecting them gives rise to a severe form of vertigo, which will be dealt with in connection with diseases of the ear. Giddiness also occurs in nervous disease, such as epilepsy, and in brain affections, especially those which involve the cerebellum or lower brain, the function of which is to maintain the equilibrium of the body.

It is impossible to decide on the treatment to be adopted for giddiness without first discovering its cause. Having found out this, we must treat the condition according to directions given elsewhere. The other symptoms which exist must be our chief guide as to the cause.

DISORDERS OF CONSCIOUSNESS

In many diseases the mental processes become disturbed and perverted. We will here briefly consider some of the most important of these disorders of consciousness. They are very common in diseases of the nervous system, but occur also in many other conditions.

Loss of consciousness occurs as a natural condition in ordinary sleep, when the part of the brain in which the intellect dwells is completely at rest and its action temporarily suspended. But the brain may be placed artificially out of action by starvation, as in an attack of faintness or syncope, when, through failure of the heart's action, an insufficient supply of blood is sent to the cerebral hemispheres. A similar condition is produced by excessive hæmorrhage. Many injuries and diseases of the brain are accompanied by the symptom of unconsciousness. In epilepsy it occurs as one of the first symptoms, but usually disappears gradually as the fit passes off. Apoplexy also is accompanied in most instances by insensibility, which may continue for days, and which only gradually disappears, the patient passing through an intermediate condition of partial consciousness called *stupor*. In concussion, or stunning, unconsciousness is produced by the violent shake given to the brain.

substance, or the injury may be more severe, and the nervous structures be actually torn, and blood be poured out, and the loss of consciousness may be more deep and prolonged.

Many poisons produce the most profound insensibility, such as extreme cases of alcoholic excess, large doses of opium, morphia, and other narcotic drugs, and the inhalation of general anæsthetics. These are poisons introduced from without, but some poisons formed within the body cause extreme forms of unconsciousness, often ending in death, the most remarkable being those developed in the late stages of diabetes and kidney disease.

Exposure to extreme degrees of cold for long periods, and to excessive heat, very high fever and inflammation of the brain and its membranes, are all causes of this symptom. In these conditions the unconsciousness is often very profound, and is spoken of as *coma*. The patient is very likely to die without recovering consciousness, unless treatment can be successfully applied.

The treatment suited to these very varied conditions will be found in the parts of this work where the respective causes are dealt with.

Delirium is a wandering of the mind, in which the thoughts are incoherent and the expressions and actions bear no true relation to surrounding objects. It is frequently a sign of some diseased condition of the brain and its membranes, especially of inflammation, and is met with in the various forms of insanity. It may also be produced by the presence of poisons in the blood, which, circulating through the brain, derange its action. These poisons may be formed in the body itself, as in severe kidney disease, in which urea accumulates in the blood, or they may be introduced from without, as in the infectious fevers. Many active drugs may also derange the mental faculties if taken in excessive quantities, such as alcohol, opium, and Indian hemp.

In high fever, however produced, wandering of the mind is common, the raised temperature of the blood apparently acting directly on the brain and disturbing its functions without the presence of any poison.

Delirium also occurs in states of great exhaustion, whether caused by wasting disease, severe hæmorrhage, or the shock of operations.

Delirium, too, is very liable to show itself in the course of ordinary illnesses, and then appears at the time between waking and sleeping, before the patient has realised where he is and by whom he is surrounded. This mild form is of no importance, and gradually passes away as health is restored.

In some cases the delirium may take a violent, active form, in which the patient raves and shouts, is intensely excited, and struggles violently if he is in any way restrained. This violent form of delirium accompanies "brain fever," mania, and highly feverish disease.

Another variety of delirium, which is a perfect contrast to the one just described, comes on in the later stages of prolonged and exhausting illness. In it the patient lies prostrate and unconscious, muttering to himself, and only notices what is taking place around him to weave it into his dreams, which are full of strange imaginings. This condition forms part of what is spoken of as the typhoid state, so called from its very common occurrence in the exhaustion stage of typhoid fever.

In other cases a "busy" delirium is met with, in which the patient talks incessantly and incoherently, arranges and re-arranges his bed-clothes, or picks at the blankets or anything within his reach.

Delirium tremens is yet another variety, which affects those who are soaked with alcohol, and is often brought on by a sudden accident or illness which confines them to bed. In it the tremulousness of all the muscles of the body is most marked, and the delirium is a combination of many and varied illusions.

Forming an important part of all forms of delirium, but sometimes occurring apart from it, are the various perversions of consciousness called illusions, hallucinations, and delusions. These **Illusions.** terms are often used as having the same meaning, but some distinction can be drawn between them.

An *illusion* is a misinterpretation by the brain of something that is actually seen or heard. A shadow is seen, and is supposed to be the ghost of some departed friend, or a sound is heard and interpreted as a message.

An *hallucination* is purely imaginary, originates in the disordered brain, and has no connection with surrounding objects. If the affected person acts upon these imaginings and attempts to obey the supposed voices, he suffers from *delusions*.

Hallucinations are not necessarily a sign of either delirium or insanity, for many persons see objects or hear sounds which by the exercise of their reasoning powers they know to be imaginary, and they may then be said to be subject to sane hallucinations.

The subject of insanity is too complicated for detailed notice in these pages, but we may briefly describe the various forms that unsoundness of mind may assume.

First there is the mental weakness which is present at birth or

which shows itself shortly afterwards, to which the name of idiocy is applied. In this condition the healthy development of the brain never takes place, and the weakness is lifelong, although much may be done by careful education and training.

Idiocy. Melancholia, or madness characterised by mental depression, is one of the commonest forms of insanity. It comes on gradually, and follows in many cases a severe illness or great mental shock. Suicidal tendencies are its most characteristic accompaniment. If recovery occurs—and it is estimated that this happens in more than half the cases—it does so gradually and within twelve months of the onset.

Melancholia. Mania is madness characterised by mental exaltation. It may come on suddenly or insidiously; it may follow a severe illness or an attack of melancholia. Hallucinations and delusions occur, and the victim's mind becomes filled with a tumultuous flow of ideas. These at first may almost appear as manifestations of genius, but gradually they become incoherent and disconnected. Recovery may take place either suddenly or slowly, and if it occurs it is usually within the first two years. After that period few cases get well.

Mania. Monomania is a form of insanity in which the patient entertains a fixed delusion, which dominates his thoughts and conduct. He may be perfectly intelligent in every other respect, but on this one subject he brooks no interference, and may become violent if thwarted or contradicted. Recovery seldom occurs; the monomania continues without change for many years, and often ends in dementia.

Monomania. Dementia is the insanity of decay; it is a frequent result of many diseases of the nervous organs, of severe feverish affections, of dissipation, nervous shock, and old age, and forms a common termination of the other varieties of madness. The moral and intellectual faculties fail, the patients gradually lose the powers of reason and memory, of loving or hating; they are under the influence of various delusions, which influence their actions, and their condition as a rule grows worse and worse.

Dementia. The last form of insanity to be mentioned is general paralysis of the insane, a disease of the nervous system which is caused by a chronic inflammation of the surface of the brain. The symptoms of this terrible malady consist in increasing loss of mental power with paralysis, and they always lead on to a fatal issue.

**General
Paralysis of
the Insane.**

CATALEPSY, ECSTASY, REVERIE, TRANCE

These are curious nervous phenomena which are sometimes met with in neurotic, high-strung persons as the result of great nervous disturbance or strain. The exciting cause may be fear, excitement, rage, or religious emotion, and the persons most commonly affected are the young of both sexes, women who are distinctly hysterical, and men who are of emotional temperament. History records many attacks of these conditions appearing in almost epidemic form. For instance, the dancing mania which appeared in July, 1374, at Aix-la-Chapelle and spread over the Low Countries, and the antics of the sect of Convulsionaries which sprang up in France in 1730, are nearly allied to the state of ecstasy, for the dancers became quite insensible to external impressions, and lost all consciousness of their surroundings.

In all these conditions loss of consciousness and loss of sensation exist. In catalepsy the patient is attacked suddenly after violent emotion, becomes corpselike, pale, and insensible, with hardly perceptible respiration and pulse. The muscles become rigid and fixed, retaining the body and limbs in the position they were in at the time of the attack, or in any position, however constrained or unnatural, in which they may be forcibly placed by another person. The attacks may last from a few minutes to many days. Death rarely occurs, though there is some danger to life from the difficulty of administering sufficient nourishment.

One who is subject to ecstasy or reverie is absorbed by some overpowering fancy or delusion, and becomes unconscious of all external impressions. She may gesticulate wildly, may scream out imprecations or ejaculate disjointed prayers, according to the variety of delusion which possesses her. Religious ecstasy is a common form of reverie, and many cases have been recorded in which beatific visions were seen and unearthly things heard.

The condition of trance is that of deep sleep continued for long periods, with complete insensibility to external impressions, and with the natural functions of the body reduced to the lowest ebb—almost, indeed, to extinction. It is in such cases that premature burial may have taken place in olden times and in countries where interment has to be carried out without delay.

The treatment of these conditions must be carried out in the light of their close connection with hysteria, epilepsy, and mental disease. Judicious management and moral persuasion are of more importance

than any medicines. Food must be administered regularly, and if necessary the stomach-pump must be resorted to for the purpose.

SOMNAMBULISM

Sleep-walking is closely allied to trance and similar nervous conditions. It chiefly affects youthful persons of nervous temperament, and is a sign of disease, for it does not occur in those who are perfectly healthy, and it should therefore receive treatment without delay, as it may lead on to more serious trouble. The portion of the brain which presides over consciousness is asleep, whilst the parts controlling muscular movements, the voice, etc., are fully awake, and even the intellect may be active. In this condition many people carry on long conversations, recite poetry, make speeches, or converse in foreign languages, and some instances are known of their solving abstruse problems and writing poems.

It is commonly believed that sleep-walkers never meet with accident, but this is a mistake, for many deaths occur from injuries received in this state. Many deeds of violence, too, have been committed by somnambulists, of which they are totally ignorant in the waking state, or which they only remember as a painful dream.

We should first discover the cause of the condition, whether it be general ill health, indigestion due to errors in diet or heavy meals taken near to bed-time, mental emotion, excessive brain work, violent grief, fright, bodily fatigue, or affections of various organs, such as the liver or the ovaries. Remedies should then be applied accordingly. The sleeping conditions should receive attention: care should be taken to lie with the head high, resting on the side and not on the back, and with only sufficient clothing to keep the body at a comfortable warmth, neither too hot nor too cold; and the bedroom should be kept well ventilated. As the trouble usually occurs in profound sleep, it may be prevented by waking the sleeper at the end of the first hour of sleep, when it is usually deepest; and if it happens at a certain regular hour, he may be awakened just before the time by an alarm.

A sleep-walker ought never to be awakened suddenly, or the shock may produce serious nervous symptoms. He should be led back to bed, or ordered to return there in a quiet, authoritative tone.

SLEEPLESSNESS

Insomnia, or sleeplessness, is a condition which is occasionally experienced by all of us in a mild form, and is then an annoying con-

dition only, but in other cases it becomes a serious and even dangerous malady. The loss of one night's sleep is followed by fatigue and exhaustion, that of several nights by severe nervous troubles, whilst less than a fortnight's absolute sleeplessness is enough to cause death. The amount of sleep required to maintain the body in health varies with age, sex, occupation, and habit. A baby sleeps the twenty-four hours round, only waking up for his meals and a spell of crying; a child of ten requires from twelve to fourteen hours' sleep; at the age of fifteen, ten to twelve hours' sleep is necessary, whilst for an adult eight hours' is sufficient, women needing rather more than men. Hard mental or manual labour necessitates more sleep than a life of leisure, and it is usually observed that mental fatigue requires longer rest than corporeal. Sleep may be taken at any time in the twenty-four hours, and the special value popularly attached to "beauty sleep" can have but little foundation in fact, for it is surprising how quickly persons become accustomed to an alteration in their hours of rest. Nurses on night duty soon sleep comfortably and restfully in the daytime, and sailors remain in perfect health when at sea, although their regular watches may only allow them spells of rest four hours long.

Sleeplessness may be the result of a great variety of conditions, and it is necessary to know them, as their removal is the chief desideratum in treatment.

Some people unconsciously train themselves to be bad sleepers by not going to bed in the right spirit. The idea of sleeping should occupy the mind at this time, and other thoughts should be exorcised. If going to bed is looked upon as a good opportunity for a little self-communing, a time to think over the events of the past day or to make plans for the coming one; if a book or a newspaper is carried to the bedroom to read just for a few minutes until the feeling of sleepiness becomes overpowering, a bad habit is acquired, and restlessness and wakefulness follow. Bed is the place to sleep, and not to think, and if the habit is to get into bed and at once to compose the mind and settle the body in a comfortable and accustomed position, sleep will seldom be wooed in vain.

There is some difficulty in deciding for others what is right in the matter of eating and drinking before going to bed. Discomfort connected with the digestive organs is a fruitful source of sleeplessness, and anyone who is at all troubled with a weak digestion would be very foolish to set it to work just before retiring to rest. In theory the process of digestion draws the blood from the brain into the abdomen,

and ought to cause a sensation of drowsiness. Thus many people indulge in forty winks in an easy chair whilst their digestions are disposing of their dinners. But if anything but a very light meal is taken near to bed-time the later stages of digestion are not found to be so soporific, but the process becomes slowed or even checked, a feeling of discomfort, distension, and weight is set up, followed by unpleasant dreams, restlessness, and irritability.

Sleeplessness is very likely to be caused by certain poisons which are taken as luxuries—namely, tea, coffee, alcohol, and tobacco. These, taken in excess—and very little may be excess in some persons—stimulate the brain and increase the circulation of blood through it, and thus make sleep impossible. Constipation is sometimes productive of insomnia, and a good purge in such cases acts as a more effective sleeping draught than a dose of opium. There are a large number of conditions which cause sleeplessness by over-strain and exhaustion of the nervous system, such as excessive brain work, worry, grief, anxiety, and suspense, and probably it is nerve exhaustion that will explain the severe insomnia which often accompanies the condition known as neurasthenia. In such cases it is impossible for the brain to adjust itself to sleep, for it is fully occupied by some train of thought, pleasant or the reverse. For this form of insomnia the most suitable drugs are bromide of potash and hydrate of chloral, which are simple sedatives, and may be taken in the form recommended below (p. 344) if the various accessory measures are unsuccessful.

Sometimes sleep becomes impossible from excessive exercise, the body being over-fatigued and exhausted. In such cases, food with a little stimulant, followed by a short rest before going to bed, is the proper treatment.

Pain is, of course, one of the great causes of want of sleep, and until it is assuaged rest is out of the question. This symptom must be relieved by various sedatives, and it is wisest first to try external applications. If these fail it is necessary to resort to the stronger sedatives or narcotics, such as morphia and opium.

Unhealthy states of the circulation of blood through the brain, whether it be an excess or a deficiency, prevent this organ from resting. Anæmia and congestion of the brain thus both produce sleeplessness. Many diseased states in which poisons circulate in the blood, or in which the temperature of the blood is raised, such as feverish diseases in general, and gouty, rheumatic, or malarial conditions, are accompanied by insomnia.

But by far the larger number of attacks of sleeplessness are caused by quite trivial conditions, such as a fresh bed, unaccustomed surroundings, unusual noises, change of air, or discomfort from being too hot or too cold. When one is cold the blood is driven from the skin, and much of it finds its way into the vessels of the brain and produces restlessness, and so it is that many people find it impossible to go to sleep when their feet are cold.

Those who suffer from sleeplessness often have means of their own which they employ to induce sleep. For instance, they repeatedly count over certain numbers, engage their thoughts with some uninteresting and imaginary sight, or with some monotonous repetition of words. In these and similar ways the mind is occupied but feebly with an idea that requires very little attention and is easily displaced by the suggestion of sleep which the constant repetition engenders, and which forms a sort of self-hypnotism.

As far as possible all disturbing causes should be obviated, such as noises and forms of discomfort. The bedroom should be airy, the

Treatment. bed comfortable and firm (a feather bed is very undesirable), the bedclothes light, but sufficient to keep the body warm. For those who feel the cold or suffer from cold feet, various measures can be recommended—a warm bath before getting into bed, with a good rub with a towel; a fire in the bedroom; a warm drink, which in many cases may be the popular “night-cap” and include a moderate dose of alcohol; a hot bottle for the feet, and a well-warmed bed. If the hot bottle is found to be only an annoyance, the feet may be warmed by putting them into cold water and then drying them thoroughly with a warm towel. Although a heavy meal near to bedtime may cause restlessness, the opposite effect is often obtained by some light, easily digested, warm food on retiring: a glass of warm milk or gruel, Benger’s food, and malted milk are all suitable, but they must be warm, and not hot. Warmth applied to the stomach is very soothing, and it may take the form of hot poultices, warm compresses, or the indiarubber hot-water bottle. The adage “After supper walk a mile” is good advice, as the exercise causes fatigue, warms the feet, and increases the flow of blood through the muscles.

Some persons fall to sleep at once, but after a few hours’ rest wake in the early morning and cannot get to sleep again. This occurs in nervous exhaustion and after excess in the use of tobacco or alcohol. It can be relieved by removing some of the bedclothes or by walking round the room two or three times to cool the body, or by washing the

face and hands in cold water, or by taking a biscuit and some milk or a glass of water.

If these and many other common-sense measures prove unavailing, drugs must be resorted to, but these should never be employed without real necessity. Sleeping draughts and sedative medicines in general are two-edged: they cause sleep, but they are also very liable to cause unpleasant after-symptoms. They should not be employed without medical advice, for there is a possibility of doing much harm by forcing the brain into unconsciousness with drugs without removing the condition which makes it abnormally active.

Bromide of potash is both safe and efficacious in those forms of sleeplessness unconnected with pain. It may be taken at bed-time in doses of from 10 to 30 grains, either in a mixture or in tabloids. It is often prescribed with hydrate of chloral, or this drug may be taken alone; 10 grains is a moderate dose, or a teaspoonful of the syrup of chloral. These drugs have been combined with Indian hemp in a very useful sedative medicine called Bromidia, of which one teaspoonful in water makes a good sleeping draught. There is, however, the objection to chloral that its use may establish a habit.

Sulphonal 10 grains, Trional 10 grains, and Veronal 5 grains, are some of the newer remedies for insomnia; they are sold in tablet form. The first is somewhat uncertain in the length of time it takes to act.

In sleeplessness caused by pain, and in extreme cases in which other measures have been tried and found wanting, we must resort to the use of opium and its various preparations, the most important of which is morphia. This drug is obtained from the garden poppy, and may be taken in the form of a pill, powder, suppository, or draught, or it may be administered with a needle under the skin. Tincture of opium, or laudanum, and a special preparation called nepenthe, are the best forms for ordinary use. The dose of either for an adult would be about 15 to 20 drops in a tablespoonful of water at bed-time, whilst the dose of morphia is $\frac{1}{6}$ or $\frac{1}{4}$ grain.

The objections to sleeping draughts are many. They are liable to cause furred tongue, indigestion, constipation, and headache. When once used they are difficult to discontinue; one is likely to become dependent upon them, and cannot sleep without them. They are prone to create a habit or craving, which may lead to the direst results. Opium and morphia are dangerous when given to children or to persons suffering from disease of the kidneys or severe disease of the lungs.

NEURASTHENIA

Neurasthenia is a state of nerve exhaustion and general debility which has a somewhat indefinite meaning. It has been long recognised as a condition produced by a variety of causes, but can even now hardly be looked upon as a distinct disease. But it is so exceedingly common in everyone's experience, and so often spoken about, that we must give a brief description of its causes, symptoms, and treatment.

Neurasthenia must be looked upon as one of the diseases of the strenuous life of the present day, and in that sense is of recent origin, although it may be produced by many causes which have been with us for ages. It is one of the common results of "wear and tear," whatever guise it may assume, and it more commonly affects the subjects of inherited nervous weakness than others.

It may follow excessive muscular exertion, especially in those unaccustomed to it; or overwork of the mind, whether in business or in pleasure. Anxiety, worry, and nerve-strain in general are amongst the most active of exciting causes. During the convalescent stage of severe exhausting diseases, especially in that of influenza, it is of very common occurrence, and it may be produced by excessive indulgence in certain articles of diet, such as alcohol, tea and coffee.

The symptoms may affect all the organs of the body—the nervous system, the muscles, and the digestion. The patient loses his power of work, of mental concentration, of taking his ordinary amount of exercise; his memory fails, his brain, muscles, and system generally soon tire and become exhausted. He sleeps badly and awakes unrefreshed, complains of feeling nervous and of being easily upset, of attacks of terror which come upon him without reason. Palpitation of the heart is common, as also are fits of trembling in the muscles, these often taking the form of "live blood" in various parts of the body. A sense of discomfort in the head, or even severe headache, causes much anxiety, and the sufferer is generally out of health, weak and miserable, and capable of doing nothing with energy.

The treatment consists chiefly of rest for body and mind, and many cases are much benefited by the Weir-Mitchell rest cure, to be described elsewhere. Hydropathy in the form of hot and cold baths and wet packs applied locally, either to the abdomen or spine, or generally to the whole body, are useful in many cases. A modified rest cure in which rest, exercise, massage, and electrical

treatment all take a part is, in all but the most extreme cases, to be recommended rather than the extremely strict isolation and inaction usually employed for the Weir-Mitchell treatment.

Indigestion and constipation must be overcome by appropriate remedies; anæmia by iron and strychnia combined with plenty of fresh air; sleeplessness by wet packs and similar measures rather than by sleeping draughts. The diet should be liberal and nutritious, and contain plenty of animal food.

HYSTERIA

Hysteria is a disease of the nervous system in which the emotions overpower the will and the judgment. There is no visible disease in any organ of the body which will explain the symptoms, and the brain and nervous system show no evident changes in their structure. For this reason it is spoken of as a functional disease. But, though a functional disease, it cannot be looked upon as unimportant, for the condition is one that taxes all methods of treatment at our disposal to the utmost; and, although it is not likely to cause death, yet it ruins many a life, destroying all its pleasure and usefulness, and reduces many a woman to chronic invalidism, making her a source of constant worry to her friends. The disease is almost confined to the female sex, although cases are occasionally met with in boys and, more rarely still, in nervous and highly emotional men. It is scarcely known amongst savage races, and amongst civilised nations it is very unequally distributed, the Latin peoples being more susceptible to it than the Anglo-Saxon, and developing it to a far more extreme degree.

Its first appearance is usually at an early age, commonly about puberty, but no period of life is exempt from it, and the time of the change of life is often complicated by its manifestations. The predisposing causes of hysteria are not very definite. In some cases a

Causes. distinct hereditary tendency can be traced from nervous diseases in the parents; in others hysteria may be due to injudicious training during childhood. A nervous child who may be delicately constituted is brought up at home having every whim gratified and every trifling ailment treated with excessive sympathy. She is sent to school during the time of development and growth, and, instead of having plenty of healthy exercise and fresh air, is cooped up in a close schoolroom and crammed with book knowledge, and then, or later, shows hysterical tendencies as a natural result. There is no doubt that women whose nervous systems are exhausted or overwrought

are liable to fall victims to this complaint. Many women also lead lives certain in time to produce a condition of the nervous system prone to manifest hysteria upon the slightest exciting cause. Their lives are unhealthy in many ways: self and amusement occupy their thoughts, luxury and indolence their time; they neglect healthy interests and outdoor exercise, and finally the culminating point is reached and the hysterical tendency is developed into an actual attack by some powerful emotional shock. This may take the form of severe fright, strong religious impressions, unhappy love affairs, domestic worries, or a sudden reverse of fortune.

The symptoms of hysteria are so many and so strange that to enumerate them we should have to refer to every disease of the nervous system in detail and those of many other organs also, for almost every affection to which flesh is heir has been mimicked by this strange complaint. It will, however, only be necessary to give a few examples, which we will divide into those that occur in the general hysterical state and those that accompany its paroxysmal outbursts, or the hysterical fits.

In this disorder the mental condition is much altered, and although its subjects may when in good health be natural and affectionate, when depressed by illness or by such nervous conditions as worry, anxiety, or vexation, they show the **Symptoms of Hysteria.** most extraordinary moral perversion. They are irritable, unreasonable, untruthful, and suspicious. Their will is weakened; they become the prey of unregulated whims and impulses; they imagine themselves misunderstood and neglected, have a morbid craving for sympathy, and, in order to obtain it, descend to the most outrageous acts, and indulge in lies and deceit, until it becomes almost impossible to say where hysteria ends and insanity begins.

Excited sensibility is another common accompaniment; the patients cannot bear the light or the slightest sound, and the gentlest touch gives them acute pain. They complain of pain of many kinds, a pain over the eyebrow, as if a nail were being driven in; just above the groin, especially on the left side, which is increased on pressure; they suffer the sensation of a lump rising in the throat (*globus hystericus*) and threatening to choke them; they complain of numbness and loss of feeling, and involuntary contraction of muscles in various situations. Paralysis of different parts of the body is met with as a common symptom. It may affect an arm or a leg, the whole of one side, the lower half of the body, or only a group of muscles; it is apt to come

and go without reason, and to shift from one part to another. The voice may be reduced to a whisper without any apparent disease; it comes and goes quite suddenly, and is often recovered as the result of a sudden fright or of some special necessity for using it.

Digestive troubles are frequent; loss of appetite and, sometimes, distaste for food become so extreme that the patient ceases to take food at all. She may profess to be able to live without it, but if a careful watch is kept over her actions it may be discovered that she obtains it in some secret manner and eats ravenously when she imagines herself unobserved.

These symptoms vary much in importance: some are but trivial, and cause her but little annoyance, but others—for instance, the paralytic conditions—are at times so extreme and persistent that many a victim of this disorder may be incapacitated, and even bed-ridden, for many years at a time.

The milder cases are the more frequent, and fortunately usually get quite well under appropriate management, but the longer the symptoms last the less likely are they to be cured. But, however long they have lasted, and however serious they may seem, there is always the hope that some day, as a result of some sudden impulse or emotional excitement, they may suddenly disappear.

Probably the most striking and most popularly recognised phases of hysteria are the attacks of convulsions which form the hysterical fit, or so-called “hysterics.” They form what we have already
Symptoms of Hysterics. spoken of as the paroxysmal outbursts, and are really a sort of emotional or nerve storm, which is gradually worked up to, and which by its occurrence clears the nerve atmosphere and makes the patient feel better and more natural for a time. Hysterics usually occur in a woman who has been showing hysterical symptoms, who has been laughing or crying with but little excuse, or has felt the “globus hystericus” or lump rising in the throat. She gives a scream, falls on the sofa or the ground, and is attacked by violent convulsions, by which her arms, legs, and head are tossed about; she screams, cries, groans, and talks unintelligibly in turns; she suffers from intense mental excitement, and grows hot and red from her exertions. At first sight her condition seems very serious to the uninitiated, but the following considerations will enable anyone to distinguish between an hysterical fit and the only disease of importance for which it may be mistaken—namely, the epileptic fit. In epilepsy the patient gives one scream, whilst in hysteria she continues to

scream, and often makes a terrible noise. In epilepsy she is absolutely unconscious, but in hysteria unconsciousness is only apparent, for if a suggestion is made before her that something disagreeable must be done to her, she soon shows her disapproval in the plainest way. It is well that bystanders should be aware of this, for their remarks may be strongly resented later. Again, the movements of hysteria are much more violent, continuous, and general than the epileptic, and are never limited to one side of the body, as in the latter. The epileptic subject, being unconscious, takes no notice of what is occurring around her, but the hysterical subject is most observant, addresses wild remarks to those around her, complains of all sorts of strange symptoms, and may behave almost like one demented, snapping like a dog, or striking violent blows. In hysteria the face gets red and hot, but never deathly pale or blue from interference with the breathing, as in epilepsy.

Lastly, in hysterics a suitable and usually comfortable place is chosen for the fit, and no injury results from the fall; the furniture is not struck, the dress is not disarranged, nor the tongue bitten, and the attack does not come on at night when the patient is alone, but in the presence of a sympathetic company who may comfort and assist her. The fits last an indefinite period: they may be all over in a minute or two, or may continue, on and off, for several hours.

The fit having once been recognised as hysterical, the treatment should be carried out with as little fuss as possible, and with a firm and authoritative manner, for over-sympathy is sure to make things worse and prolong the attack. Most attacks of hysterics may be cut short by smelling-salts or by the old and approved remedy of a copious douche of cold water to the patient's head, and it has been recommended that the latter should be "sudden and lavish," care being taken not to spoil the carpet. A good substitute is to dip the corner of a towel in cold water and to flap the hands and face with it pretty vigorously. A still more effectual remedy is to close the mouth and nose with the hand or a towel for fifteen or twenty seconds, so that breathing is prevented. There can be no doubt that recovery is often retarded by injudicious sympathy and tenderness, whilst a calm, firm manner is often very helpful in bringing the paroxysm to a speedy conclusion.

The treatment of hysterical tendencies and their cure is very difficult, and taxes the patience and good nature of the best. The affection must be looked upon as a nervous disease and treated accordingly. At home, surrounded by the

Treatment of Hysterics.

Treatment of Hysteria.

affectionate care and sympathy of relatives, it is often quite incurable. It is usually best, therefore, to let the patient have a complete change of scene and surroundings, and this can most easily be carried out by placing her under the care of a kind but firm nurse in her own room, apart from other members of the family, or by sending her away from home. The Weir-Mitchell treatment has been very successful in these cases; the patient is kept in bed, completely isolated from everyone except the nurse, and fed with abundance of easily digested food. Electricity and massage should be used daily to take the place of exercise. In some cases hypnotism has been tried with success, especially in France, but this must be employed with caution, as there is always the danger of aggravating rather than ameliorating the symptoms. In milder cases all that may be necessary is to attend to the general health, relieve anæmia with iron, debility with tonics, and encourage healthy and active habits, occupying the mind with interesting pursuits and outdoor amusements. There is little doubt that the hysterical tendency may be eradicated by early treatment; and children who are brought up healthily and properly, with abundant fresh air and food and avoidance of overwork, and are trained from infancy in self-control, seldom develop the complaint in later life.

HYPOCHONDRIASIS

Hypochondriasis is as distinctively a disease of men as hysteria is of women, but, fortunately, it is not nearly so common. The name, derived from the Greek, means "under the cartilages," and was given to the complaint in ancient times because it was thought that derangements of the liver (situated under the cartilages of the ribs) were the cause of the trouble. It is chiefly met with between the ages of twenty and forty, and in men who have no definite occupation to fill their time and thoughts, who are independent financially, or whose work in life is prematurely finished. It is due to an unhealthy condition of the nervous system closely allied to that met with in hysteria, neurasthenia, and insanity; and although many cases are cured by appropriate treatment, others drift on for years and gradually pass into the form of madness called melancholia. Hypochondriacs, as such persons are called, often inherit a family history of insanity or other nervous complaint. If the section on insanity is referred to, it will be seen that the affection we are describing shows just those symptoms that are described as monomania (p. 338), the mental state being that of depression, and the special subject which occupies the mind being that

of the health; but, unlike the melancholic patient, who shows suicidal tendencies, the hypochondriac is always striving to get well: he wanders about from doctor to doctor, tries all the drugs he hears of, and is never so happy as when he finds some new remedy with which to experiment on himself. He aids in filling the pockets of every quack who comes in his way, and swallows their nostrums with avidity, without apparently losing belief in remedies in spite of their constant failure to relieve him of his trouble. He is entirely engrossed in his disease, imagining it will kill him or incapacitate him from the enjoyment of life, and finally invents absurd and almost insane explanations of trifling sensations, such as that he has toads and serpents in his interior which consume his food. Although most of his trouble is imaginary, yet a hypochondriac is liable to suffer from indigestion, flatulence, or gout, the symptoms of which have probably given rise to his illusions.

Such an individual should be encouraged to engage in some active work which will fill his time and exercise his mental powers. Ridicule will not cure him, but reasonable advice may do so, for he is not mentally deficient. Drugs are not of much value, except so far as they aid in removing passing troubles, relieve constipation, improve the appetite, or tone the nervous system. He should never live alone, but should have the companionship of a strong-minded friend. With such a one he will obtain much benefit from travelling, for his thoughts will be drawn off from himself and his interest fixed on other matters.

It is important, before dubbing a man a hypochondriac and treating him as such, to make quite certain that he really is suffering from no organic disease; he should be thoroughly examined by a doctor, and if no disease of any organ can be discovered he should be encouraged in every way to forget his ailments and discard all drugs.

CHAPTER XVIII

DISORDERS OF THE SPINAL CORD AND BRAIN (*concluded*)

Inflammation of the Brain—Apoplexy—Major Epilepsy—Minor Epilepsy—Irregular or Jacksonian Epilepsy—Tetanus—Hydrophobia—Structural Headaches—Toxæmic Headaches—Dyspeptic Headaches—Congestive Headache—Anæmic Headache—Sick Headache—Electricity in Nervous Disorders.

INFLAMMATION OF THE BRAIN

INFLAMMATION of the parts within the skull is very serious, and when any symptoms arise which point to such trouble it is always wise at once to obtain skilled advice. We shall, however, briefly describe these diseases, so that the symptoms likely to arise may be at once recognised.

Inflammation of the brain is called encephalitis, and that of the membranes covering it meningitis, and the two conditions nearly always occur in conjunction. Meningitis can be divided into three chief varieties: (1) simple inflammation, (2) inflammation produced by the presence of tubercles, and (3) the infectious cerebro-spinal meningitis.

Tubercular meningitis will be found amongst the diseases of children, and the infectious form amongst the fevers. We will here describe *simple* meningitis. This is the disease which is popularly spoken of as "brain fever," but that term is very vague, and is not now used by medical men in reference to any particular disease. In the great majority of cases of simple meningitis the inflammation has originated in some other part, and has spread to the brain membranes. This occurs in disease of the bones of the skull, especially the temporal bone, and may be due to ear affections. Meningitis may also be caused by injury to the skull or brain, and by exposure of the head to the direct rays of the sun.

The symptoms usually come on suddenly, and thus distinguish simple meningitis from the tubercular form, in which their occurrence is gradual. Headache is almost constant, with pains in the neck and

tenderness of the scalp, accompanied by vomiting which has no connection with any stomach trouble and is unattended with loss of appetite. The early stages are usually marked by fever, with great irritability of the special senses: the eyes are unable to bear any light, the ears any noise, or the skin the slightest touch, and the patient is tremulous, restless, irritable, and sometimes delirious.

As the disease advances the temperature falls, the pain subsides, and the irritability passes off, and the patient's condition seems to be distinctly improving. But this is delusive, for he passes gradually into a drowsy condition, which grows more intense and finally ends in a state of insensibility or coma, which may be complicated with violent attacks of convulsions, during one of which the fatal termination may take place. The duration of the disease is uncertain, but is usually about a fortnight. It is very dangerous, but the outlook is not quite so serious as in the tubercular variety, for even cases which appear desperate sometimes recover.

The essentials of treatment are complete rest and the careful avoidance of everything that may excite the sensitive nervous system. The food should be very limited and of the lightest kind.

Treatment. Whenever possible, medical assistance should be obtained without delay. The head should be shaved and cold lotions or ice applied to it to relieve the headache; leeches or blisters may be used behind the ears; free purges should be given to remove the constipation, and perspiration encouraged to reduce the fever.

Congestion of the brain may be brought on by long-continued mental anxiety and overwork, by excessive indulgence in alcohol, and by some of the acute fevers. The symptoms are giddiness, headache, spots before the eyes, noises in the ears, and, in the more severe attacks, delirium, convulsions, and unconsciousness. It should be treated by rest, quiet, abstinence from work, worry, and alcohol, and, during convalescence, by a change of air and scene.

APOPLEXY

Apoplexy is the disease commonly called a "stroke" of paralysis, and is caused by the bursting of a blood-vessel and hæmorrhage either in the substance of the brain or on its surface. The name is derived from the Greek, and means "a stroke," and was used originally, and still is popularly, to signify any sudden loss of consciousness and of power of movement produced by an unknown cause. But nowadays it is limited, in medical parlance, to the condition we have mentioned.

The chief predisposing cause of hæmorrhage of the brain is a diseased state of the blood-vessels of this organ, and anything that causes this condition is therefore also a predisposing cause. The disease was considered to be hereditary, but it is probably only a tendency to diseased vessels which is handed down and makes the affection one which runs in families. As indulgence in alcohol and excessive muscular exertion tend to produce diseased arteries, they are causes of apoplexy, and as they are more often met with in men than women the former are more often victims of this complaint. Disease of the brain arteries seldom occurs in at all an advanced degree under the age of forty, and although hæmorrhage of the brain is occasionally met with even in children, it is pre-eminently a disease of old age or of those who are prematurely old from disease or dissipation.

The one disease of the brain arteries which concerns us in this connection is that called atheroma (p. 212), in which their walls are softened and often become stretched into small aneurisms. The arteries may also become brittle from the deposit of chalky material in their coats. As a result of these conditions, it takes but a slight extra strain to break or tear the blood-vessels and pour out the blood into the brain substance. In most old people the heart muscle fails to a corresponding extent with the blood-vessels, and the force of its beat is no stronger than the arteries are able to bear; but if the arteries grow old sooner than the heart, as is sometimes the case, there is great danger of an attack of apoplexy. Occasionally on the very day that a "stroke" occurs the patient may feel better in health and spirits than usual, and an explanation may be found in the fact that his heart is beating with greater energy and force and supplying all his organs with increased nourishment, but the enhanced force is more than the weakened blood-vessels of his brain can resist, and apoplexy occurs as the result of their bursting. Chronic disease of the kidney is a common cause of increased blood pressure, and in this way acts as a predisposing cause of apoplexy. By some, much importance is attached to a short, thick-set neck as predisposing to apoplexy, but it is difficult to explain how this can have any influence; persons of this build are often, however, full-blooded or plethoric, which may render them more prone to hæmorrhage. The bursting of a blood-vessel in the brain may also be caused by injury, such as severe blows on the head or spine, and this form can, of course, occur at any age.

The "stroke," as a rule, comes on quite suddenly in a person

apparently in good health, but there are some warning signs which may be present for a few days preceding the attack. These consist

Symptoms. of sensations of numbness or tingling, or pains in the limbs, giddiness, headache, temporary confusion of thought, loss of memory, difficulty of speech, drowsiness, sleeplessness, irritability of temper, bleeding from the nose, or double vision.

The apoplectic stroke may justify its name and be absolutely sudden, the victim becoming suddenly unconscious and falling down paralysed, or there may be a sudden pain in the head with giddiness, or a sudden attack of faintness. In other cases its advent is more gradual, a man engaged at his ordinary occupation losing all power in his arm, or becoming paralysed on one side of his face, his mouth being drawn to one side, and his speech thick and indistinct. Unconsciousness may be absent from such cases, but in the great majority the hæmorrhage continues, and in the course of a few hours it develops until the patient passes into a state of profound coma.

When the paralysis affects the right side of the body, even if the consciousness is unaffected, there is often complete loss of the power of speech, called aphasia.

The apoplectic state is as follows :—There is complete unconsciousness, from which nothing can rouse the patient; the face is flushed or blue, and covered with perspiration; the pupils are large, and usually one is much larger than the other; the breathing is slow, difficult, snoring, and accompanied at each breath with a puffing out of the cheeks; the pulse is full and slow. The arm or leg on the affected side, if lifted, drops “dead,” while that on the other falls more slowly. From this condition the patient may never recover; the breathing grows weaker, the unconsciousness deeper, and terminates in death. If the shock and bleeding do not prove fatal the patient gradually recovers consciousness, and although in rare instances no paralysis may remain, usually one side of the body is permanently weak, wasted, and stiff. The mental condition is also usually much weakened by the disease.

One apoplectic stroke, if recovered from, is very likely to be soon followed by another, and each stroke will be more serious and leave graver effects in its train.

It is often a very difficult matter to say whether an unconscious person is suffering from apoplexy or is stupefied by a large dose of opium, helplessly intoxicated, faint, stunned, or suffering from epilepsy or uræmia; yet it is a very important matter to make the distinction, as

the method of treatment entirely depends upon it. For instance, the treatment required for poisoning with alcohol and opium might make an apoplectic stroke fatal. As the subject of unconsciousness and the method of recognising its causes have been described already, we will here consider only the points that particularly apply to the unconsciousness of apoplexy. The first is that the limbs on one side of the body only are paralysed; they are never moved by the patient, and are heavy and helpless when raised. There may also be loss of symmetry in the face, the mouth being drawn to one side, denoting paralysis of the other. An inequality of the pupils, one being large, the other small, is a point strongly in favour of the attack being apoplectic.

The patient should be treated very gently and moved about as little as possible, for fear of increasing the hæmorrhage. The head should be raised by a pillow under the shoulders, and cold wet rags or an ice-bag applied to it, and hot bottles to the feet, but care could be taken that these are not too hot, or sores may be caused. The clothes should be loosened about the throat and chest, and if the breathing is very laboured and noisy it may sometimes be relieved by turning the patient over on to his side. The bowels should be freely opened, and for this purpose nothing is better than 2 drops of croton oil or 4 grains of calomel powder placed on the back of the tongue, for other medicines are difficult to administer to an unconscious patient; these doses act powerfully, and should not be used except under medical advice, unless this is unobtainable. The head may be shaved with advantage, as this keeps it cool and enables cold applications to act more efficiently. In old days an apoplectic patient was always freely bled, but little benefit seems to have been obtained, and the practice is now seldom resorted to.

Great care must be taken in feeding an unconscious patient, for there is always danger of the food passing into the air passages and causing suffocation. As a rule no harm comes of a day or two's fasting, and it is far better to give food by the bowel than by the mouth. No alcoholic stimulants should be allowed, or the hæmorrhage will be increased. During convalescence the diet must be light and unstimulating, limited in quantity to the amount absolutely necessary, and consist of milk and light farinaceous foods, gradually improved by the addition of chicken and fish, meat being returned to only with great caution. Massage and electricity are useful measures to preserve the condition of the paralysed muscles until the nervous system has

recovered its powers, and the general health may be improved by fresh air and, if possible, gentle exercise.

In persons predisposed to apoplexy something may be done in the way of preventive treatment. They should avoid excessive exertion, violent mental emotion, over-indulgence in eating or drinking, exposure to extremes of temperature, straining at stool, tight clothing round the neck, long-continued stooping, and very warm baths.

EPILEPSY

Epilepsy is a disease that has been known from ancient times, and descriptions of it have been handed down from the oldest medical writers. It affects all races of men, and has been known to occur in the lower animals. By the ancients it was ascribed to demoniacal possession, or to the anger of their offended deities. The Romans regarded it with particular dread, and if it attacked anyone in the forum considered it an ill omen and suspended all public business for the day, and named it, from this circumstance, "*morbus comitialis*." It was also called the "*morbus sacer*," as it was considered to be of supernatural origin. Its popularly used English name is the "falling sickness," from one of its prominent symptoms; and, from its convulsive seizures, it is the disease which is referred to under the name of "fits." Epilepsy, its medical name, is derived from a Greek word meaning a "seizure."

The actual cause of the complaint is still unknown, but there are many well-recognised predisposing causes. The first of these is inheritance, and this is shown in a peculiar way. The ancestors of an epileptic are frequently found to have handed down, not necessarily epilepsy itself, but a condition of nervous instability and proneness to nervous complaints of many kinds. In many cases the ancestors have suffered from epilepsy itself or from some other form of nervous disease, such as mental weakness, St. Vitus's dance, or hysteria. Alcoholic excess in a parent also hands on to the offspring a weakened nervous system with a proclivity to many nervous complaints, one of which is epilepsy. Men and women are about equally liable to it. In a large proportion of cases the disease begins in early life, about three out of every four first attacks occurring before the age of twenty. The mental powers of those who suffer from epilepsy are usually much impaired, and grow progressively weaker, but many remarkable exceptions are known, for Mahommed, Julius Cæsar, Peter the Great, and Napoleon were all victims of the disease. A very

evident predisposing cause is the indulgence to excess in alcoholic stimulants by the patient himself, who can in this way produce a predisposition quite apart from that of inheritance. The exciting causes may be any form of derangement of the nervous system, or any circumstances which produce nervous excitement or irritation, acting through the mind or the body upon a system already predisposed, such as fright, fits of anger, irritation of intestinal worms, the troubles of dentition, or witnessing fits in others. Injuries to the head are not unfrequently an exciting cause.

Epileptic attacks may be placed in three distinct classes: (1) the severe form, or *grand mal*; (2) the slighter form, or *petit mal*; and (3) irregular forms.

As a rule the epileptic fit is preceded by certain premonitory or warning symptoms, which it is of great importance to recognise, for they may give the patient time to place himself in a position of safety, and, if promptly met by suitable treatment, the attack may be warded off. They may take the form of some unusual sensation affecting a particular part of the body, and known as an "aura." This may be situated in the pit of the stomach or in the heart region, such as heartburn or palpitation, or in one of the extremities, as a finger or toe, where a feeling of cold or heat, tingling or pain, may start, and rise gradually upwards to the head, heart, or stomach, upon reaching which consciousness is lost. In other attacks the aura affects one of the special senses: flashes of light or sensations of colour occur in the eyes; noises, strange or musical sounds, or even voices are produced in the ears; unpleasant odours or disagreeable flavours in the senses of smell or taste. Or, again, the brain may be the part affected: the individual becomes dreamy or experiences a sensation of strangeness or even terror, or he may see some strange sight or spectral illusion; one patient always had the idea of a man shooting pigeons, another a vision of a hideous donkey. Rapid movements sometimes precede a fit: the body may be twirled round rapidly, or the person may set off to run violently for a few minutes. The premonitory symptoms, therefore, may take many forms, but in each patient the same aura is usually repeated before each fit. These warnings precede the fits by an interval varying in different cases, sometimes by a day or two, but more usually by a few minutes, or even seconds.

The onset of a fit is often accompanied by a loud scream or yell, which is very distressing to hear, and may have so disturbing an

**Major
Epilepsy.**

effect upon the hearers as to throw them into hysterics. It is accompanied by a sudden death-like pallor of the face, and followed almost instantaneously by complete unconsciousness. This

The Fit.

comes on so suddenly that the patient has no time to save himself, and not unfrequently receives serious injury, cutting or bruising himself against the furniture, or falling into the fire. The body becomes rigid, the back arched, the features set, and the breathing ceases. The face becomes a livid purple, the veins of the neck swell up, the eyes protrude, a gurgling sound is heard in the throat, and there seems imminent danger of death from suffocation. But after a short time (from ten to twenty seconds) these fixed spasms of the muscles cease, and violent convulsive movements set in and involve all parts of the body. The limbs are thrown about in various ways, the face is hideously contorted, the mouth is alternately opened and closed with violence, and the tongue, protruded and caught between the teeth, is apt to get severely bitten, a bloodstained froth covering the lips. The breathing at this stage recommences in a noisy, violent, and jerky manner, the heart beats violently, the pulse is full, and the skin bathed in perspiration. The stage lasts at the longest from two to three minutes; the symptoms gradually subside, and the patient is left in an exhausted and unconscious condition.

The unconsciousness may disappear almost immediately, or may last for half an hour and disappear gradually. The patient may wake up at once after the fit, seemingly in perfect health, or he may remain in a stupid, incoherent condition, much resembling that of a drunken man. At other times he may become violently delirious, or he may fall into a state of trance or ecstasy, or may drop off into a deep sleep. It is in the half-unconscious condition left by a fit that patients have been known to commit crimes of which they remember nothing, and for which they are not accountable: they may tear their clothes and destroy anything that is near them in fury; they may belabour their friends, may rush out of the house and attack the first stranger they meet, or commit suicide by leaping out of the window. The fits follow one another at perfectly indefinite intervals, varying from some hours to some months, but a very dangerous condition is sometimes met with in which one fit succeeds another with hardly any appreciable interval, and the patient remains insensible in what is termed the "status epilepticus."

In the intervals between the fits, epileptics may appear to be in perfect health, but after a time, as one fit succeeds another, the nervous

system becomes decidedly affected, and they become low-spirited, querulous, or excitable; their memory fails; they find great difficulty in applying themselves to their work. Finally, in some cases, they sink into a state of imbecility.

At the commencement of the disease the fits are very liable to occur only at night, at the moment of going to sleep or at the moment of waking, and there is no doubt that some people may in this way have been subject to epilepsy for a long time and yet remain quite unaware of it. If, however, one wakes up in the morning giddy, headachy, and confused in his mind, finds his pillow stained with blood, his tongue sore, and bruises and cuts on his body which were not present when he went to bed, his mind should turn to epilepsy as the explanation, and other symptoms may show that it is this dire disease that has been the cause.

Petit mal is the form of the disease from which the convulsive fits are absent. The attacks may consist only of the various premonitory symptoms which we have described, and no more. The **Minor Epilepsy.** patient may complain of having peculiar sensations, which he calls "faints" or "turns," and very commonly comforts himself with the idea that they are only liver, and unimportant. Liver troubles certainly do produce such symptoms, but there is no doubt that sometimes they are as truly epileptic as the convulsions, and if they are often repeated, or grow more severe, they ought to be carefully inquired into. Minor epilepsy often shows itself by attacks of giddiness (epileptic vertigo), in which surrounding objects seem to whirl round, or the patient himself seems to rotate; this sensation is sometimes accompanied with temporary unconsciousness, and is then undoubtedly epileptic.

At other times the attacks are simply a momentary interruption in the continuity of thought. The patient is engaged in talking, and suddenly for a second or two becomes quiet, and then resumes the thread of his conversation as if nothing had occurred. At such times he may become very pale, or his mind may wander temporarily, and he may utter a few unintelligible words during the short attack of unconsciousness, or he may suffer from a sensation of perplexity or horror. Sometimes the unconsciousness is more than momentary, and may last a few minutes, during which the patient may continue his occupation uninterruptedly: if walking or running he will continue to do so, and the story is told of a violinist who played his instrument with perfect accuracy as if he were still in his ordinary senses. Other

persons have been known to do and say extraordinary things whilst in this state; they will dance or sing or peer about, and even perform some violent or criminal act. Upon recovering their senses they have no recollection of what has occurred; they seem to have been acting as in a dream, and, from a medico-legal point of view, cannot be considered responsible for what they have said or done.

Jacksonian epilepsy has been described by Dr. Hughlings-Jackson. It consists in convulsions without loss of consciousness, certain muscles or groups of muscles being affected. In it a different part of the brain is affected from true epilepsy, and certain distinct changes of structure have been found in this organ, whereas in true epilepsy no appearances of disease are found characteristic of the affection, the brain seeming to be perfectly healthy.

Epilepsy is rarely fatal during the fit, except as the result of accident. The sufferer may tumble into the water, be drowned when bathing, fall from a horse or from a scaffolding or over a precipice, and may even be choked when eating. It can be well understood, therefore, that such persons should never be left alone.

The first point in treatment which we must consider is, What can be done to prevent the attacks? When there is a distinct warning of their approach much may be done. When it consists of pain in a part, the fit may often be stopped by rubbing or by pressure of the hand; when it is a peculiar sensation passing up the limb, it may be arrested by tying a handkerchief or bandage tightly round the limb, or even better by tying and untying it several times in rapid succession. Stimulating the nostrils with snuff or strong smelling-salts is also useful. When the aura takes the form of muscular contraction, an efficient measure is forcibly to hold the contracting part straight and stretch the affected muscles; for instance, if it is a contraction of the muscles of the neck which occurs, drawing the chin towards one shoulder, the preventive treatment is forcibly and rapidly to turn the head towards the other shoulder; or, if it is the muscles of the forearm which contract, a forcible straightening of the hand and forearm may check the attack. If the aura is uneasiness in the stomach, a dose of sal-volatile, spirits of chloroform, or spirits of ether should be tried. It is impossible to give all the possible preventive measures which may be useful, as they vary according to the form the warning takes, but the following are some of the measures that may be adopted: Suddenly dashing cold water in the face; forcibly pressing the thumb backwards; a blow, pressure, or friction on the parts where

**Irregular
Epilepsy.**

**Preventive
Treatment.**

muscles become rigid; plunging the hands into hot water; the application of a lump of ice to the back of the neck or between the shoulder-blades; taking rapid, deep breaths for several minutes; running or jumping violently, or reading very loud and fast. The inhalation of certain powerful drugs has been found valuable in some cases; chloroform, ether, and nitrite of amyl being the three most useful. These are dangerous drugs for the patient to use himself, but the danger is much lessened by employing the little glass capsules which are to be obtained containing definite doses; they should be crushed in the hand and cautiously inhaled. The patient should take care to lie down before using them, until he has fully acquainted himself with the effect they may have on him. The full effect of nitrite of amyl is not obtained until the face flushes and a sense of pulsation is felt in the head.

Having considered the various preventive measures, we now come to the treatment of the "fits." Immediately loosen the collar, necktie, and anything tight round the throat and chest. Take every precaution to prevent the patient injuring himself against the furniture or floor. Place a pad of cloth, a piece of cork or indiarubber, a bit of wood or the handle of a toothbrush wrapped in a handkerchief, between the back teeth to prevent the tongue from being bitten. Do not throw cold water over the patient, but lay him on a couch or rug, and protect him from harm and exposure. Throw the windows open and prevent the crowding of people round. If you have some capsules of nitrite of amyl or chloroform, let him inhale one. When the fit is over, place him on a bed and let him sleep off the effects with his head high, and lying on his side. When the fits are frequently repeated it is a good plan to have a cylinder of oxygen at hand and allow the patient to inhale the gas during the convulsion.

Lastly we must consider the treatment of the disease itself, and there can be no doubt that the most useful of all drugs are the bromide compounds. Bromide of potash, bromide of ammonia, bromide of soda, and bromide of strontia are the various preparations, but the first is chiefly to be recommended, especially in combination with the others. It may be taken in doses of from 5 to 30 grains, three of the 5-grain tabloids three times a day being an average quantity in an ordinary case. Dr. Brown Séquard (a great authority on nervous diseases) recommends a tonic mixture containing arsenic or strychnia (3 drops of the solution of either), to be taken three times a day after meals, and also the following prescription:—

PRESCRIPTION 114

Iodide of potash	.	.	.	.	2 drachms.
Bromide of potash	.	.	.	.	1 ounce.
Bromide of ammonia	.	.	.	.	3 drachms.
Bicarbonate of potash	.	.	.	.	1 drachm.
Tincture of calumba	.	.	.	.	1 ounce.
Water	.	.	.	.	6 ounces.

Adults should take four doses in the twenty-four hours—one teaspoonful in a tablespoonful of water three times a day before meals, and at bed-time three teaspoonfuls in half a wineglassful of water.

Bromide of potash nearly always does good in epilepsy, but it is essential that it be continued with great regularity, omitting no doses, and that it be persevered in for a very long time, in order to work a complete cure. It is no good to take it for a few weeks and then leave it off until the next fit occurs. The foregoing mixture should be taken without interruption until there has been no fit for two years. The objections to bromide of potash are that it sometimes causes much drowsiness, affects the memory, and brings out an eruption of little hard, red spots on the face and shoulders, but these symptoms are very unusual after the mixture we have recommended; if they occur, the medicine must of necessity be discontinued for a short time.

While this medicine is being taken, general hygienic measures should be adopted. A quiet, regular life should be chosen, if possible in the country, and the most suitable occupation is that of a farmer or a gardener; as far as possible the calling chosen should be one in which there is no risk to life in the event of a fit occurring. The seaside should be avoided, as the fits are often aggravated by sea air. Children should be educated, but the amount of work should be carefully regulated, and stop short of over-pressure on the weak nervous system. Adults should continue their occupation if suitable, but must avoid mental fatigue or anxiety.

The clothing should be warm, and flannel be worn next the skin, especial care being taken to prevent coldness of the feet and catching cold. Plenty of sleep is necessary, and the patient should make a habit of going early to bed. Cold douche baths night and morning, followed by brisk friction, are beneficial, and a systematic, moderate amount of outdoor exercise should be taken.

The bowels must be carefully regulated with mild aperients, and the diet must be simple and digestible; milk, eggs, and vegetables may

be taken freely, but meat foods only with great moderation. Coffee, tea, and alcohol should be entirely given up.

The question of marriage may possibly arise, and it must be remembered that the children of epileptic persons are apt to suffer from nervous disease. The intermarriage of epileptics should be absolutely prohibited.

TETANUS

Tetanus, or "lockjaw," is a disease of the nervous system produced by a micro-organism which usually finds admission to the body through a wound. It may, however, find entrance as the **Cause.** result of exposure to cold without any injury. It has become much less common since the introduction of the antiseptic method of treating wounds. The popular belief that wounds about the thumb or big toe are particularly liable to be followed by the disease is erroneous. The latent period varies from a few hours to a month, and the shorter it is the more severe and more dangerous is the attack. The chief symptom is a violent spasm of the muscles, which first shows itself in those of the neck and jaws (hence its popular name), and gradually spreads over the body. In bad cases the temperature rises extremely high.

The disease may be prevented by treating a wound, immediately it occurs, with antiseptic lotions and dressings. When the disease has developed, treatment consists in putting the patient to bed in a perfectly quiet, darkened room, maintaining his strength with abundant nourishment by the mouth or by injections, and soothing the nervous system with repeated doses of bromide of potash and chloral. Much success has been obtained by the use of an antitoxin, which should be given with the greatest promptitude and injected under the skin or directly into the brain or spinal cord. This serum treatment is assisted by injections under the skin of a drug called curare, and of cocaine or eucaine. In spite of every care the disease is very fatal, and the poison is said to be 150 times more powerful than strychnia.

HYDROPHOBIA

Rabies, or hydrophobia, is a disease of the nervous system which affects man, the dog, the cat, and many other animals, and is produced by the bite of an animal suffering from the complaint. The cause is a poison which is present in the saliva of the affected animal, and can only be introduced into the body through a wound; it is harmless if applied to the unbroken skin or mucous membrane.

The poison does not affect the appearance or healing of the wound in any way; it remains quiescent for a period of from nine days to twenty-eight months, the average being from four to six weeks.

The first symptom is a feeling of illness and depression, followed by twitchings of the muscles of the face and an inability to swallow.

Symptoms. If the patient attempts to drink, he experiences a sudden "catch" in his throat, due to spasm of the muscles, and to this symptom the disease owes its name of hydrophobia, or "fear of water." Within two or three days of the appearance of this symptom the disease ends fatally; the spasms or convulsions spread over the whole body, are brought on by the slightest irritation, and cause the greatest agony. The fatal result is due to exhaustion from want of nourishment and from the violence of the convulsions.

The treatment is both preventive and curative. When a bite is received from a dog suspected to be mad, the wound should at once be cauterised freely with a stick of lunar caustic, pure carbolic acid, or a red-hot instrument, and then dressed with some antiseptic. If the dog is then proved to be suffering from rabies, the patient should without delay undergo a course of Pasteur's antirabic inoculation treatment.

Rabies can be recognised with certainty by inoculating some of the nerve substance of the affected animal into a rabbit, which will develop the disease in from fifteen to eighteen days. But it would be imprudent for anyone who had been bitten to wait as long as this before starting the inoculation treatment. A shorter method, which will probably be employed, consists in a microscopic examination of the nervous structures of the affected animal, and the discovery in them of minute structures called Negri's bodies, which are believed to be the microbe of the disease.

Hydrophobia is a rare disease; it is unknown in Australia, and, as a result of muzzling regulations, coupled with quarantine of all imported dogs, has practically been extirpated from this country, at any rate for a time.

HEADACHE

Headaches are amongst the commonest of the ailments of life, and yet few cause more trouble by interfering with everyday duties and upsetting an individual's power for work and capacity for attending to social engagements. The strain of life is constantly increasing, and with it the liability to the ailments of an overworked nervous system.

Pain in the head cannot be considered a disease in itself, but is a symptom of many different conditions, and the result of a variety of causes. For this reason it is not easy to give a concise and intelligible description of headaches, and the best plan will be to divide them into several classes and describe them separately. The following groups will be found to include the great majority of the headaches of which complaint is made :—

1. Structural headaches, caused by disease of the brain or of its membranes.
2. Toxæmic headaches, caused by poisons in the blood.
3. Dyspeptic headaches, caused by errors in digestion.
4. Congestive headaches, caused by excess of blood in the brain.
5. Anæmic headaches, caused by poverty of blood.
6. Sick headache, or megrim, caused by nervous exhaustion.
7. Neuralgic headaches, caused by cold, rheumatism, etc.

The pain in the various conditions may assume many characters, and be described as shooting, aching, throbbing, like a weight on the head or a band tied round it. The pain may affect different parts of the head : it may be limited to one side, as in megrim, or to one eye or one nerve, as in neuralgia, or to one spot, as in hysteria; it may be in the temples, at the top of the head, or at the back of it. It is often accompanied by other symptoms, as great sensitiveness to light or sound, spots and shadows floating before the eyes, noises in the ears, giddiness, sickness, drowsiness or wakefulness.

I. STRUCTURAL HEADACHES

Headaches may be caused by disease inside the skull, amongst which are affections of the brain and its membranes. Inflammation of the brain and its membranes, syphilitic disease, tumour, or abscess in the chief organ of the nervous system, all cause most severe pain, and although such cases are unsuitable for domestic treatment, we will mention the most important symptoms which are developed with the headache, in order that it may be distinguished from the more simple forms and treated accordingly.

One peculiarity of structural headache is its intensity and persistence; it continues day and night, with exacerbations in certain circumstances. It is increased by lying down or by stooping, and relieved by having the head raised. It is often fixed in one spot, which may be tender to pressure, and it may be accompanied by paralysis, especially a limited loss of power in one or more nerves,

such as squint or drooping of the upper lid, or by disease of the optic nerve, causing dimness of vision. Vomiting is very common in this form of headache; it may be constant and uncontrollable, and yet be unattended by digestive disorder, nausea, furred tongue, loss of appetite, and pain in the stomach all being absent; nor does it bring relief to the pain in the head. Little can be done to give relief, but treatment by iodide of potash may entirely cure those attacks which are due to syphilis.

2. TOXÆMIC HEADACHES

Many headaches are caused by the presence of poison in the blood. In acute feverish diseases this is one of the explanations of pain in the head, the raised temperature of the blood also probably acting injuriously on the nervous structures. The poison of gout, of malaria, the waste products which accumulate in the body from excessive meat eating or alcoholic excess, the effects of chronic constipation and the presence of urea from advanced kidney disease, are all examples of poison-headache; but probably the most familiar is the headache caused by the poison given off during respiration and inhaled in the air of a crowded and ill-ventilated room, especially when it contains the products of combustion produced by many gas lights. The removal of the poison from the body takes away the headache, but in most of the conditions we have mentioned this entails the treatment special to the disease. In the last example all that is required is fresh air, a night's rest, and a mild stimulant.

3. DYSPEPTIC HEADACHES

When the digestive organs are out of order, the processes by which the food is prepared for the body are carried out slowly or imperfectly, and the products, passing into the system, act as poisons on the nervous organs, and often give rise to headaches; we might, therefore, almost have included these amongst the poison headaches just referred to. They are often caused by irregularity and constipation of the bowels, and by a sluggish and congested liver. Under such conditions they form part of the condition known as biliousness, and are commonly called bilious headaches. Many persons have regular attacks of bilious headache, which come on every ten days, or once a month, and after the attack they feel much the better for it. These recurring attacks may be prevented by proper treatment adopted when the first symptoms are noticed, such as irritability of temper, heaviness of the head, and

discomfort in the stomach, which herald the attack, whether they occur on going to bed at night or on first waking in the morning. Salicylate of soda acts powerfully on the liver and stimulates it to secrete bile; and a dose of the following mixture should be taken either at bed-time or early in the morning, and a good aperient saline draught should follow it to clear the bile out of the body.

PRESCRIPTION 115

Salicylate of soda	2 drachms.
Bromide of potash	2½ drachms.
Chloroform water to 8 ounces.	

An eighth part to be taken 3 times a day, or as directed in the text.

A repetition of the attacks may be guarded against by careful attention to the diet and by avoidance of all fatty and highly flavoured food.

The symptom of vomiting which so commonly attends these headaches seems almost to be Nature's mode of cure, for by it a large quantity of stale bile is got rid of, together with other irritating material, and, also, the patient is obliged to starve, and thus give his digestive organs a rest. The result of this is an immense relief, and probably we might with advantage follow Nature's lead and expect to relieve such attacks by administering an emetic, as, indeed, was a common custom amongst old physicians. Emetics have, however, fallen out of fashion, and the stale bile and waste material are removed by a dose of some such mixture as the above (Pr. 115) to stir up the liver, combined with a purge to carry them out of the body.

These headaches are much relieved by a grain or two of blue pill taken at bed-time, and followed the next morning by a dose of Epsom salts or of aperient mineral water. Many of the symptoms of bilious headache, such as a weight across the forehead, pain in the eyes, specks floating before them, with nausea and sickness, also occur in eye headaches, which we shall describe under the heading of Neuralgic Headaches, and the treatment for which is, as we shall see, quite different.

4. CONGESTIVE HEADACHES

When the vessels of the brain are congested or over-full of blood, headache is produced, and such a condition may be set up by excessive mental exertion, emotional excitement, abuse of alcohol or of tobacco, worry, or full living. It is common in gouty or full-blooded persons,

and in women who suffer from periodic irregularity. Congestive headaches may also be due to a fulness of the veins of the brain caused by affections of the heart or lungs, which impede the flow of blood, or even by mere mechanical obstruction to the return of blood from the head that may be caused by a tight collar or by an awkward position of the neck when asleep. The pain is dull and heavy, the whole head throbbing; the face is flushed; there are noises in the ears, depression of spirit, and giddiness. Lying down or stooping, exertion or noise, all increase the symptoms.

The patient should keep quiet, resting with the head well raised. Cold should be applied to the head, whilst the feet and legs are placed in hot mustard and water, and sometimes benefit is obtained from a mustard leaf to the nape of the neck. A dose of the salicylate of soda and bromide mixture (Pr. 115) should be taken, the bowels should be freely opened with 1 grain of calomel at bed-time and a dose of salts in the morning. The diet should be spare, no stimulants should be taken, exercise should be regular and moderate, as much time as possible spent out of doors, and business worries, overwork, and mental fatigue avoided, in order to guard against a repetition of the attacks.

Much benefit may be also obtained from a thorough change of air and a course of the waters at such places as Carlsbad, Marienbad, and Kissingen.

5. ANÆMIC HEADACHES

Any condition which sets up general debility and a watery condition of the blood produces this form of headache by depriving the nervous structures of their requisite nourishment, and thus rendering them exceedingly sensitive. This is seen in a marked degree in women who suffer from chlorosis and anæmia, and in such as have had free or frequent hæmorrhage or exhausting discharges. Anæmic headache is also produced by great fatigue or by over-indulgence in alcoholic beverages.

The pain is usually continuous, although it may come on with greater severity as a result of mental or bodily exertion. It is aggravated by assuming the erect position, and relieved by lying down with the head low, so that the blood may flow with greater freedom through the brain. The pain is most commonly referred to the top of the head, and is accompanied with great pallor, disturbed digestion, constipation, depression of spirits, drowsiness, sleeplessness, and many other nervous symptoms.

The headache may be relieved by small doses of stimulants, such as tea, coffee, alcohol, or sal-volatile; by nourishment, as a cupful of strong soup. Temporary benefit may be obtained from a tablet of phenalgin, phenacetin, or some other of the anti-neuralgic drugs, and from rest in the recumbent position. But to effect a cure it is necessary to restore the general health, improve the condition of the blood, and encourage the action of the excreting organs. Iron and arsenic are useful tonics, especially the former, and the mode of its administration is referred to under *Anæmia* (p. 42). A change of air to one of the spas which possess iron waters, such as Schwalbach, in Germany, can be strongly recommended. At such places may be obtained an easily digested form of iron, with a mild, unstimulating climate, rest of mind, regular exercise, change of scene, fresh air, and invigorating baths.

6. SICK HEADACHE OR MEGRIM

Sick headache is one of the commonest troubles of humanity; its medical name is *megrin*, or *migraine*, and is an abbreviated form of *hemicrania*, which means "half the head," because the pain is usually limited to one side. It is frequently inherited, occurring in several generations of a family, the members of which are commonly subject to many other nervous affections. It is more common in women than men, but many distinguished men have been victims to it. The first onset of the disease is seldom after forty, one-third of all cases beginning between the fifth and tenth years, and it usually disappears gradually as age advances, seldom being prolonged in either men or women over the age of fifty.

Sick headache is produced by an extraordinary variety of causes. Anything that causes nervous exhaustion will set up an attack—over-
Causes. work or worry, a close room, emotional excitement, or a long railway journey. It may be caused by digestive troubles, by eating some particular article of food, by long fasting, or by constipation. Many exciting causes act indirectly on the nervous system—disease of many organs, decayed teeth, adenoid growths in children, and various affections of vision causing eye-strain. These sight affections are of particular importance because of their great frequency, and they may cause this form of headache just as they may cause neuralgic headache, to be dealt with in our next section. Atmospheric conditions act powerfully on some people—rapid changes of weather, the atmospheric states that precede a thunderstorm or a

fall or thaw of snow. The affection is predisposed to by the gouty or rheumatic constitution.

The attacks are peculiar from their paroxysmal occurrence; they are liable to return at frequent and often regular intervals, on the same day every week or every fortnight or every month.

In many cases there are distinct warnings preceding the attack for a day or two; there is a sense of general depression, fulness of the head, indigestion, or chilliness. Shortly before an attack

Symptoms. there are often disturbances of vision—bright spots of light, luminous zigzag lines or “fortifications,” bright-coloured circles or “wheels of fireworks.” At times there is partial blindness, a blurring of objects, seeing only with half the eye, or a blind patch in the centre of the vision, or there may be strange optical illusions, such as visions of mice or dogs, or images of persons. The other senses may be also affected. There may be numbness of some part, cramps or spasms of muscles, partial loss of speech, and dizziness. The headache starts in some spot, and is at first limited to a small area; it affects the eye, temple, or forehead, and gradually spreads wider and wider, but is usually limited to one side only. The pain is excessively severe, and has a sharp piercing or boring character. Nausea and vomiting often follow; hence the term “sick” headache. A large quantity of exceedingly bitter bile is brought up with undigested food, and relief is often obtained when the stomach is unloaded. The face, at first pale, grows flushed and hot, and the artery of the temple on the affected side throbs violently with the beats of the pulse. The symptoms which we have enumerated are much increased by bright light, noise, or movement.

As we have said, vomiting often gives relief, and the patient falls asleep. On awakening, the attack has usually spent itself, and for some little time there is a feeling of relief, as if the unpleasant experiences through which the sufferer has passed have really done him good, and he is able to take liberties with himself and his digestion which at another time would infallibly upset him. As a rule attacks of sick headache do not last more than twenty-four hours, and pass away after a night’s rest, although in severe cases they may continue for several days.

The treatment of megrim must be directed to prevention and the relief of the attacks. Preventive treatment consists in removing, as far as possible, the various causes. Excitement must be avoided, the meals must be regular, and the diet moderate. Gouty persons must

be particularly careful of what they eat and drink; they may often receive much benefit from a visit to Carlsbad, and a useful medicine

Treatment. to ward off the attacks is the salicylate of soda and bromide mixture (Pr. 115).

In children special attention should be given to the sight, for in them, and also in adults, megrim may often be completely cured by wearing suitable spectacles. Adenoids should be removed by operation. The "rest cure," described in another part of this work, is often attended with much benefit to anæmic and nervous persons.

During the paroxysm the patient is fit for nothing, and must lie down in a quiet, darkened room. It is no good attempting to take food, for the nervous system is in such a condition that the digestion ceases to act, and food, if taken, will only make matters worse, and will finally be rejected by vomiting. This condition of the digestion explains the fact that when once the attack is well established drugs have hardly any effect upon it, for they remain unabsorbed in the stomach; but if they are taken during the premonitory stage, much relief may be experienced and the headache prevented. A cupful of hot, strong tea or coffee, the inhalation of 20 drops of chloroform from a capsule, a strong dose of brandy and water, or a teaspoonful of sal-volatile with water, may give relief, according to the idiosyncrasy of the sufferer. Some persons find comfort from plunging the head into hot or cold water, from applying a cloth wetted with spirit and water, or from a wet bandage tied tightly round the head with a pad of firm material under it, which brings pressure to bear on the temporal artery or the most painful spot.

The drugs that have been recommended for, and have been found useful in, this disorder are very numerous. One that is very frequently employed is antipyrin; it is taken in tablets of 5 grains each, and the dose is two tablets. These may be taken every two hours for three doses only, and the patient should lie down and keep perfectly quiet after taking the dose. It is liable to disagree with many people, and occasionally causes depression or troublesome eruptions. Phenacetin is also useful; the dose is 5 grains, and it can be obtained in tablets; it is better taken combined with caffeine, a heart tonic, and the compound phenacetin tablets contain these two drugs. Caffeine also gives relief in megrim; it can be taken in many forms—in tablets of 2 or 3 grains of the citrate of caffeine, as the granular effervescent citrate of caffeine in teaspoonful doses, as effervescing citrate of caffeine and bromide of potash (dose, one teaspoonful, which contains 5 grains of bromide of

potash), and as migranin (dose, 10 grains), in which it is combined with antipyrin. Exalgin, antikamnia, antifebrin and caffeine, ammonol, and phenalgin are all to be obtained in tablets, and are all useful in certain cases. Guarana, or Brazilian cocoa, can be recommended; 15 or 20 grains of the powder should be infused in a cup of boiling water. A teaspoonful of bromo-soda often proves useful.

In those cases in which there is much flushing of the face and throbbing of the arteries, a teaspoonful of the liquid extract of ergot in half a wineglassful of water has been found successful; it should be taken every hour for not more than three doses. It would be well also to try the effect of arsenic, 3 drops of the solution with water three times a day after meals.

Many physicians recommend Indian hemp as one of the most satisfactory preventive remedies, and Dr. Sinkler orders it in the following prescriptions:—

PRESCRIPTION 116

Extract of Indian hemp	. . .	$\frac{1}{8}$ grain.
Extract of nux vomica	. . .	$\frac{1}{4}$ grain.
Ergotin	. . .	1 grain.

Make a pill; send twelve.

One pill to be taken 3 times a day after meals.

PRESCRIPTION 117

Extract of Indian hemp	. . .	$\frac{1}{8}$ grain.
Powder of digitalis	. . .	$\frac{1}{2}$ grain.
Lactate of iron	. . .	2 grains.

Make a pill; send twelve.

One pill to be taken 3 times a day after meals.

These pills are to ward off attacks, and should be continued for some time.

Lastly, it is important to remember that the earlier in an attack the medicine is taken the greater is its effect, and that the digestion may be so checked by the disordered nervous system that neither drugs nor food are absorbed whilst the headache continues.

7. NEURALGIC HEADACHES

This form of pain in the head is due to some disorder of the nerves, which are involved in many cases in an indirect manner by disease in other parts. It may be started by a decayed tooth, by an affection of the ear, or by some defect in the eyes. This last condition is a fruitful

source of headaches, and no case which has proved itself at all obstinate to treatment should be neglected in this respect; the eyes should be examined by an oculist—not an optician, be it observed—and if they are found to be imperfect in any respect suitable glasses should be obtained, and will, in most cases, be found entirely to remove the headaches.

Neuralgic headaches are also caused by exposure to draughts or cold east winds, especially in those who are rheumatic. The nerves of the head are liable to injury by pressure; they are very numerous, lie between the skin of the scalp and the bone, and many of them pass through bony channels. It can therefore be easily understood that the swelling occasioned by inflammation, whether set up by cold or injury, will cause very acute pain from the pressure of the unyielding bone. It is said that many a neuralgic headache has been cured by discontinuing the use of a hard hat, which has produced the pain by pressure on the nerves.

The pain in these cases is similar to neuralgia of other parts, and the treatment is the same (p. 320).

ELECTRICITY IN NERVOUS DISORDERS

Electricity is frequently employed in the diagnosis and treatment of nervous diseases. Two forms of it are used, the galvanic current and the faradic current. In the former the flow of electricity or current is continuous, and always in the same direction, namely from the positive pole to the negative, whilst in the latter the current is made up of very rapidly repeated short shocks passing alternately in each direction. Galvanic electricity is therefore called the continuous current, and faradic the interrupted current. The current is generated in a battery which differs in construction according to the variety of electricity; it is conveyed by well insulated flexible wires, and is applied to the body by “poles” or electrodes of various shapes, according to the object which is being aimed at in the treatment.

The electrodes consist of knobs or discs covered with washleather, of metallic cups in which sponges are fixed, or of large pads of sponge or flannel, and are provided with insulating handles so that the person holding them is not affected by the current. They must be applied to the body in such a way that the part to be influenced is placed between them, and the electricity passes through it. The commonest

method is to fix a large flat electrode on one wire and place it on the nape of the neck, whilst a small ball-shaped one is fixed to the other wire, and applied to the part under treatment.

For the galvanic electricity the battery should contain from thirty to forty cells. Electricity, when used as an aid to diagnosis, requires skill and knowledge, only to be attained by a medical man, but when employed for treatment it can be placed in the hands of any intelligent and observant person, after he has once been shown the method of procedure.

If the current is to be limited in its action to the skin, the electrodes should be used dry, and the skin may be dusted with a little powder, but if, as is usually the case, the muscles or nerves are to be acted on, the electrodes should be well moistened with salt and hot water, and the skin also should be wetted with the liquid. By this means the skin is made a better conductor of electricity, and the pain caused by the current is much diminished.

Faradism is employed to cause contraction of muscles, and as a stimulant to the system in nervous exhaustion. It energises the muscles when exercise in other ways is impossible. It is useful in the acute stage of rheumatism of the joints, and eases the pain, and it is employed as a stimulant and curative agent in many of the affections produced by hysteria. Galvanism is a sedative, and is used to assuage the pain of acute neuralgia, such as *tic-douloureux* and *sciatica*; to soothe the suffering of *lumbago*; to relieve muscular spasm; to maintain the nutrition and prevent the wasting of paralysed muscles until the cause of the paralysis has disappeared, and to improve the condition and relieve the pain of parts affected by chronic inflammation or stiffened by chronic rheumatism.

When employing electricity it is important to use no greater strength of current than will carry out the purpose in view—if it is to cause muscular contraction the weakest current capable of doing so; if to relieve pain or spasm, only such a current as produces a slight degree of tingling. The treatment also should not be continued at each “sitting” for more than five, ten, or at the most fifteen minutes, and when galvanism is being employed, the poles should not be kept applied for any length of time to one spot.

The knowledge that electricity is beneficial in many conditions may possibly mislead some into thinking that there is a similar virtue in

the "electric," "magnetic," or "galvanic" appliances that are so widely advertised. There is no doubt that some of these are capable of giving a current of electricity, but this is wrongly applied, irregular in action, and impossible to direct or control. In some cases troublesome sores have been produced by the constant application of the electricity to one part of the skin. Many persons have derived benefit from wearing such apparatus, but there is no doubt that this results from the warmth and support which the belt affords rather than from any electrical virtue which it may possess, and that the benefit could be obtained as efficiently and at much less expense by wearing an ordinary flannel binder or cholera belt.



